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STUDIES IN THE LAURACEAE, VI

PRELIMINARY SURVEY OF THE MEXICAN AND
CENTRAL AMERICAN SPECIES

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*Concluded from page 364*4. *Nectandra* Rolander

Nectandra Rolander ex Rottboell in Act. Univ. Hafn. 1: 267. 1778; Grisebach, Fl. Brit. W. Ind. 281. 1860; Meissner in DC. Prodr. 151: 146. 1864; Hemsley, Biol. Centr. Am. Bot. 3: 74. 1882; Mez in Jahrb. Bot. Gart. Berlin 5: 393. 1889.

DISTRIBUTION: Tropics of America, the bulk of the species occurring in South America, particularly in the Andes, with about 38 in Central America and Mexico, and a few in the West Indies, the fringe of the latter just touching the mainland of Florida.

The genus consists of trees or shrubs with various types of glabrous or pubescent foliage. The alternate leaves have blades that are membranaceous to rigidly coriaceous, lanceolate, elliptic, or obovate, often with variously expanded and recurved leaf-bases. The blades are usually pinninerved, rarely subtriplinerved, the reticulation being obscure to extremely conspicuous. Pubescent axillary glands are frequently conspicuous on the lower surface. The inflorescences are usually paniculate, axillary or subterminal, with peduncles of varying length, the bracts deciduous, with the pubescence variable. The flowers are always perfect in the species found in this area. The tube may be conspicuous or almost entirely lacking. The equal lobes are lanceolate to elliptic, ovate or occasionally obovate, usually fleshy and papillose, occasionally membranaceous, almost always spreading or reflexed at anthesis, and usually deciduous. The stamens of the outer series are either fleshy, petaloid, papillose, and ovate, or quadrate or orbicular, with conspicuous connective-tissue, or they are reniform or subreniform, frequently emarginate, with no apparent connective tissue, the cells occupying the entire anther. The four cells are always introrse and usually are arranged in an arc-like formation, very rarely this arc is obscure. The anthers are sessile or borne on filaments of varying length and thickness, often pubescent, particularly at the base. The stamens of the third or inner series are usually quadrate;

in the flowers bearing the petaloid outer series, the inner also may be fleshy and papillose, with truncate connectives; in other cases, they are not fleshy or papillose and the connectives are inconspicuous. The four cells are arranged in two horizontal planes; those of the upper plane are lateral or laterally extrorse; those of the lower plane are usually extrorse. The staminodia when present are for the most part stipe-like; occasionally they bear well developed heads of varying shape. The gynoecium is, except in a very few instances, completely glabrous, the ovary globose or depressed-globose, rarely ellipsoid or ovoid. The style is usually short, but occasionally may be even the length of the ovary, and bears a discoid or triangular or occasionally a peltate conspicuous stigma. The fruit is ellipsoid, globose, or oblong, borne in a more or less shallow usually woody cupule formed by the enlarged perianth-tube usually with simple margin, occasionally bearing the remnants of the perianth-lobes. This is uniformly subtended by an enlarged pedicel.

KEY TO THE SPECIES OF NECTANDRA

A. Leaf-blades not recurved at all at the base, or decurrent, not auriculate or cordate or even rounded at the base generally.

B. Largest leaf-blades never more than 9 cm. long.

 C. Largest leaf-blades up to 7 cm. long and 2 cm. broad, lanceolate-elliptic, varnished-shining above, the reticulation somewhat obscure..1. *N. Davidssoniana*.

 C. Largest leaf-blades up to 9 cm. long and 3.5 cm. broad, elliptic, not varnished-shining above, the reticulation very conspicuous.....2. *N. Smithii*.

B. Largest leaf-blades never less than 10 cm. long.

 C. Anthers of the two outer series of stamens fleshy, petaloid, papillose, never emarginate, the upper third consisting of connective tissue, the remaining space occupied by the cells.

 D. Anthers of two outer series ovate or quadrate, the cells not forming a perfect arc; leaves membranaceous.

 E. Anthers of the two outer series definitely ovate; largest leaf-blades not more than 14 (usually 12) cm. long; lateral nerves 4 or 5 pairs.....3. *N. Breneissii*.

 E. Anthers of the two outer series definitely quadrate; largest leaf-blades not less than 15 (up to 26) cm. long; lateral nerves 7-12 pairs.

 F. Leaf-blades shining above, densely and prominently reticulate throughout, elliptic, the base cuneate.....4. *N. ambigens*.

 F. Leaf-blades somewhat shining above, with loose very obscure reticulation throughout, elliptic, oblong-elliptic or ovate-elliptic, the base roundish or obtuse usually.....5. *N. rubriflora*.

 D. Anthers of two outer series ovate-orbicular or suborbicular, the cells forming a perfect arc; leaves not membranaceous.

 E. Young branchlets, lower surface of leaf-blades, and inflorescence densely and conspicuously ferruginous-tomentose; leaf-blades elliptic.....6. *N. Schippii*.

 E. Young branchlets, lower surface of leaf-blades, and inflorescence not densely and conspicuously ferruginous-tomentose.

 F. Young branchlets, young leaves, and inflorescence densely fulvous- or brownish-tomentose; blades obovate; anthers of two outer series truncate; cupule hemispherical.....7. *N. Austinii*.

 F. Young branchlets, young leaves, and inflorescence not densely fulvous- or brownish-tomentose; blades not obovate; anthers of two outer series not truncate; cupule cyathiform.

G. Leaf-blades pale green, usually with the venation and reticulation showing whitish, often with large ellipsoid axillary pubescent glands on the lower surface, but conspicuous on both surfaces.....8. *N. panamensis*.

G. Leaf-blades not pale green with conspicuous whitish venation and reticulation; axillary glands if present rather inconspicuous.

H. Leaf-blades with lateral nerves 8–12 pairs.....9. *N. globosa*.

H. Leaf-blades with lateral nerves 4–6 (–7) pairs.....10. *N. ramonensis*.

C. Anthers of two outer series of stamens not fleshy, petaloid, or papillose, but quadrate or reniform, subreniform, or suborbicular, and frequently emarginate, the cells occupying the entire anther.

D. Anthers quadrate, sometimes apiculate.....11. *N. Heydeana*.

D. Anthers reniform or subreniform or suborbicular.

E. Greatest width of leaf-blades at and below the middle, the blade tapering only toward the apex.....12. *N. Gentlei*.

E. Greatest width of leaf-blades exactly at the middle, the blade tapering toward the base and the apex equally or the leaf-blades obovate.

F. Largest leaf-blades not less than 7 cm. broad.

G. Pubescence (when present on the young branchlets, lower surface of the leaf, buds, petioles, and inflorescence) predominantly canescent, not sericeous; petioles not longer than 1.5–2 cm.....13. *N. Woodsoniana*.

G. Pubescence (when present on young branchlets, leaf-buds, petioles, and inflorescence) fulvous-sericeous; petioles to 3 cm. long; flowers white and fragrant.....14. *N. Lundellii*.

F. Largest leaf-blades not more than 6.5 cm. broad, usually 5 cm., rarely 8 cm.

G. Lateral nerves 3–5 (–6) pairs; leaf-blades often subtriplinerved.

H. Leaf-blades subtriplinerved, not more than 11.5 cm. long, usually less, the apex long-acuminate.....15. *N. savannarum*.

H. Leaf-blades not subtriplinerved, 12–14 cm. long, the apex long-caudate.....16. *N. longicaudata*.

G. Lateral nerves not less than 6 pairs, usually 7–9.

H. Inflorescence usually glabrous; leaf-blades usually lanceolate-elliptic, 11–14 (–20) cm. long and 5 (–6.5) cm. broad.

I. Leaf-blades not caudate at the apex.

J. Leaf-blades always lanceolate-elliptic, not more than 2–3.5 cm. broad, always long-acuminate at the apex; reticulation prominent on the lower surface of the blades.

K. Leaf-blades glaucous above, reddish green beneath; fruit 10×6 mm.; cupule verruculose.....17. *N. nervosa*.

K. Leaf-blades grayish green throughout, or brownish, paler beneath; fruit 20×18 mm.; cupule not verruculose.....18. *N. salicina*.

J. Leaf-blades usually elliptic or lanceolate-elliptic, not less than 4 cm. broad, the apex variable; reticulation prominent throughout.

K. Leaf-blades coriaceous and pale, the reticulation obscuring lateral nerves on the upper surface.....19. *N. coriacea*.

K. Leaf-blades chartaceous, brownish or green, the reticulation not obscuring lateral nerves on the upper surface.....20. *N. salicifolia*.

- I. Leaf-blades caudate at the apex..... 21. *N. fuscobarbata*.
- H. Inflorescence variously pubescent.
 - I. Young branchlets golden- or ferruginous-sericeous or subferruginous-tomentose.
 - J. Reticulation scarcely apparent on upper surface of leaf-blades.
 - K. Leaf-blades chartaceous; axillary glands absent; young branchlets and young leaf-blades golden- "glittering"-tomentose..... 22. *N. nitida*.
 - K. Leaf-blades coriaceous; axillary glands conspicuously pubescent; young branchlets and young leaves subferruginous-tomentose.. 23. *N. perdubia*.
 - J. Reticulation exceedingly prominent throughout.
 - K. Leaf-blades oblong-elliptic, caudate-acuminate; fruit globose..... 24. *N. latifolia*.
 - K. Leaf-blades elliptic, acuminate; fruit ovoid-ellipsoid..... 25. *N. Cufodontisii*.
 - I. Young branchlets not golden- or ferruginous-sericeous or subferruginous-tomentose, sometimes glabrous.
 - J. Inflorescence and branchlets grayish- or fulvous-sericeous..... 26. *N. tabascensis*.
 - J. Inflorescence shortly pilose; branchlets glabrous..... 27. *N. Loeseneri*.
- A. Leaf-blades recurved at the base and decurrent, or auriculate and recurved, or cordate and recurved.
 - B. Base of leaf-blades decurrent and recurved, not auriculate.
 - C. Largest leaf-blades about 20-22 cm. long, membranaceous or coriaceous.
 - D. Lateral nerves 8-12 pairs; petiole not thickened..... 8. *N. globosa*.
 - D. Lateral nerves 4-6 pairs; petiole less than 1 cm. long, only slightly thickened.
 - E. Leaf-blades not more than 4.5 cm. broad; blades narrowly ovate-lanceolate, attenuately acuminate at the apex..... 12. *N. Gentlei*.
 - E. Leaf-blades not less than 5 cm. broad; blades oblong-elliptic, abruptly obtusely acuminate at the apex..... 28. *N. Skutchii*.
 - C. Largest leaf-blades not more than 17 (-18) cm., usually less than 15 cm., long, coriaceous, subcoriaceous, or chartaceous.
 - D. Branchlets, lower leaf-surface, and inflorescence densely woolly ferruginous-tomentose..... 6. *N. Schippii*.
 - D. Branchlets, lower leaf-surface, and inflorescence not densely woolly ferruginous-tomentose.
 - E. Petioles not thickened; leaf-blades only slightly decurrent at the base and very slightly recurved for less than 5 mm.
 - F. Anthers more or less ovate, obtuse, with fleshy papillose connectives; fruit ellipsoid..... 9. *N. ramonensis*.
 - F. Anthers subreniform, subemarginate; fruit globose.. 29. *N. Standleyi*.
 - E. Petioles variously thickened; leaf-blades conspicuously decurrent and recurved at the base up to 4-5 cm.
 - F. Largest leaf-blades not more than 5.5, usually 4, cm. broad.
 - G. Base of leaf-blades narrowed and recurved, making an apparent petiole 4-5 cm. long..... 30. *N. producta*.
 - G. Base of leaf-blades narrowed and recurved into an apparent petiole not more than 3 cm. long at most..... 31. *N. Whitei*.
 - F. Largest leaf-blades not less than 5, usually more than 6, cm. broad.
 - G. Leaf-blades usually shining above and heavily reticulate; anthers ovate and acutish, the connective tissue comprising the upper quarter of the anthers; stigma borne on a well defined style; cupule and pedicel 2.5 cm. long..... 32. *N. hypoglaucia*.

G. Leaf-blades not shining, inconspicuously reticulate above; anthers subreniform, the cells occupying the entire anther; stigma sessile..... 33. *N. Paulii*.

B. Base of leaf-blades cordate or rounded, conspicuously or sometimes slightly recurved as well, never decurrent.

C. Leaf-blades oblong-lanceolate or elliptic, rounded, or subcordate; young branchlets and inflorescence, if pubescent, ferruginous- or subferruginous-tomentose.

D. Leaf-blades chartaceous, subferruginous-tomentose beneath, the surface not prominently reticulate; inflorescence softly and loosely subferruginous-tomentose..... 34. *N. belizensis*.

D. Leaf-blades rigidly coriaceous, glabrous throughout, prominently reticulate above and shining; inflorescence glabrous..... 35. *N. rufa*.

C. Leaf-blades obovate to obovate-oblong, cordate or at least rounded, not recurved usually; pubescence of branchlets and inflorescence never ferruginous-tomentose, but tawny, if present at all.

D. Leaf-blades membranaceous, glabrous or glabrescent beneath at most..... 36. *N. platyphylla*.

D. Leaf-blades coriaceous or subcoriaceous, tawny-tomentose beneath; fruit densely pubescent on lower half..... 37. *N. sinuata*.

B. Base of leaf-blades definitely auriculate and recurved, the recurved auricles often overlapping conspicuously beneath..... 38. *N. reticulata*.

1. *Nectandra Davidsoniana*, sp. nov.

Arbor, ramulis foliosis fulvo-sericeo-pubescentibus celerrime glabrescentibus mox glabris, ramulorum cortice revera colore rubescenti-brunneo epidermate tenuissimo secedibili griseo velato. Folia alternata, petiolis gracilibus canaliculatis ad 8 mm. longis, laminis utrinque glabris membranaceis, supra lucidis, in sicco viridescentibus vel brunneis subtus pallidioribus, lanceolatis vel elliptico-lanceolatis, 5–6 (–7) cm. longis et 13–17 (–22) mm. latis, basi cuneatis, apice obtusis vel obtuse acuminatis, pinnerviis, costa supra inconspicua subtus leviter elevata, nervis plerumque 4-paribus supra obscuris subtus leviter elevatis angulo 35–45° divergentibus, rete venularum supra inconspicuissimo subtus haud conspicuo. Inflorescentia parva gracilis axillaris inconspicua, depauperata paniculata, glaberrima, pauciflora (ad 5-flora), pedunculo gracili glabro ad 2 mm. longo. Flores ad 4 mm. longi, pedicellis ad 3 mm. longis gracilibus, perianthio campanulato gilvo, lobis \pm 2.8 mm. longis, membranaceis papillosis; staminibus ser. I & II \pm 1 mm. longis antheris oblongo-globosis, filamento gracili triplo longioribus, ser. III \pm 1.25 mm. longis, antheris oblongis biglandulosis, glandulis brevistipitatis antheris et filamentis aequalibus; staminodiis triangularibus pubescentibus \pm 0.6 mm. longis; gynaecio glabro \pm 1.5 mm. longo, ovario ovoideo stipite triplo longiore, stylo duplo longiore, stigmate discoideo conspicuo. Fructus ignotus, niger, fide coll., receptaculo rubro, fide coll., glabro, hypocrateriformi, disco plano 1 cm. diam. subtentus, pedicello subverruculoso, ad 1 mm. longo et utrinque 4 mm. lato, margine integro.

DISTRIBUTION: Known only from the type-locality.

PANAMA: Chiriquí: Chiquero, Boquete, alt. 1830 m., April 11, 1938, M. E. Davidson 564 (fl., fr., TYPE—A, Ch) (tree; flowers cream; fruits black, with red receptacle).

The new species is somewhat like *N. salicifolia* in aspect, but the leaves are smaller than any known representative of that species. The floral

structure too is not unlike, the greatest divergence being the subglobose anthers of the two outer series, as opposed to the subreniform anthers characteristic of *N. salicifolia* and its allies. The fruit unfortunately is lacking on the specimens of *N. Davidsoniana* found in the herbaria of the Arnold Arboretum and the Chicago Museum, but the cupule is present. According to the collector, the fruit is black, and it is subtended by a red woody cupule that is hypocrateriform.

2. *Nectandra Smithii*, sp. nov.

Arbor 10–17 m. alta, ramulis foliosis minute subferrugineo-pubescentibus celerrime griseis striatis deinde griseis verruculosis. Folia alternata, petiolis gracilibus glabrescentibus canaliculatis (5–) 7–10 (–12) mm. longis, laminis utrinque glabris, basi costae excepta, membranaceis, in sicco utrinque brunneis, supra nonnihil lucidis, ellipticis, 6–8 cm. longis et 3–4 cm. latis, in petiolum leviter decurrentibus, basi cuneatis raro obtusis, apice acutis vel breviter subcaudato-acuminatis, penninerviis, costa pubescente utrinque conspicua subtus elevata, nervis plerumque 5-paribus supra paulo subtus valde prominulis angulo 35–45° divergentibus, glandulis conspicuis fulvo-pubescentibus in nervorum lateralium axillibus, rete venularum utrinque perconspicuo. Inflorescentia axillaris, brevis, paniculata, 2–3 (–5.5) cm. longa, glabrescens, pauciflora, brevipedunculata, pedunculo gracili 1–2 cm. longo. Flores ad 3.5 mm. longi, pedicellis 1.5–2 mm. longis gracilibus, perianthio subcampanulato albo(?) vel gilvo, lobis oblongis obtusis crassis papilloso-tomentosis, 2.5–3 mm. longis; staminibus ser. I & II \pm 0.8 mm. longis antheris subreniformibus filamento duplo longioribus, ser. III \pm 1.25 mm. longis antheris filamentis conspicue biglandulosis glandulis aequalibus; staminodiis oblanceolatis acutis \pm 0.6 mm. longis; gynaecio glabro \pm 1.7 mm. longo, ovario late ovoideo, stylo brevi robusto, stigmate triangulare. Fructus niger, subglobosus, minute apiculatus, ad 1 cm. diam., cupula vadosa tumescente ad 4 mm. longa, 6 mm. diam., et 2 mm. alta subtentus, pedicello 4–5 mm. longo apice ad 3 mm. diam. expanso.

DISTRIBUTION: Costa Rica, in the Caribbean cloud-forest at 1600–1700 m. altitude, and in Panama up to 800 m.

COSTA RICA: Alajuela: La Palma de San Ramón, *Brenes* 6825 (fl., Ch); Zapote de San Carlos, region of Zarcero, growing at edge of woodland in semi-shade in Caribbean cloud-forest, alt. 1600 m., March 26, 1938, *A. Smith* H.541 (fl., TYPE—A, Ch) (tree 10 m. high, base 25 cm.; bark gray, roughened by large well spaced dots, the cambium-layer yellowish; leaves shining; flowers in axillary racemes, the pedicels and round buds pink or red; petals white); La Peña de Zarcero, *A. Smith* H.590 (fl., A, Ch). PANAMA: Coclé: Vicinity of El Valle, *P. H. Allen* 774 (fr., Ch, GH, Mo). Panama: Residual forest in rolling grassland, trail from Campana to Chica, Cerro Campana, *P. H. Allen* 2652 (fr., A).

This species, also, seems to have its affinity with the variable *N. salicifolia*. The foliose branchlets, the consistently few pairs of lateral nerves, and the prominent reticulation of the small leaves set it apart from the well known species. The bulging cupule which fits snugly about the very base of the fruit is another differentiating character.

3. *Nectandra Brenesii* (Standley), comb. nov.

Ocotea Brenesii Standley in Field Mus. Publ. Bot. 18: 454. 1937.

DISTRIBUTION: Known only from Costa Rica.

COSTA RICA: Alajuela: La Palma de San Ramón, *Brenes* 5535 (127) (fl., Ch), woods and pastures; Cataracts of San Ramón, March-April, 1931, *Brenes* 13653 (fl., TYPE, Ch); Caribbean cloud-forest, Zapote de San Carlos, region of Zarcero, *A. Smith* H.469 (fl., Ch, NY); continental divide, Zarcero, *A. Smith* H.516 (fl., Ch), A.571 (fl., Ch), 4102 (fl., Ch), 4171 (fl., Ch); Suere, San Carlos, Caribbean rain-forest, on edge of ravine, *A. Smith* H.1687 (fl., Ch); Tapeseo, Alfaro Ruiz, *A. Smith* P.2620 (fl., A); Palmira, in fog-zone, *A. Smith* 4202 (fl., Ch). Heredia(?): Vicinity of Vara Blanca, north slope of Central Cordillera, between Poás and Barba volcanoes, *Skutch* 3736 (fl., fr., A, NY).

The branchlets of this species are slender, somewhat angled, striate, and early clothed with a close sericeous pubescence varying from buff or tawny to a deeper almost subferruginous color. The leaves have slender grayish-pubescent petioles that are canaliculate and measure up to 12 mm. long. The blades are membranaceous, elliptic, shining above, dull beneath, the base obtuse or almost rounded, the apex acuminate to abruptly obtusely acuminate or subcaudate. They measure up to 8-12 (-14) cm. long and 3.5-6 (-8) cm. broad, and at maturity show a slight close persistent pubescence, sparse on the blade as a whole but dense near the costa and nerves. The costa is impressed above and very prominently elevated beneath. The lateral nerves, of which there are 4 (or 5) pairs, diverging from the costa at an angle of 35-45°, are slightly elevated above and more prominently so beneath, bearing only a slight suggestion of axillary glands. The inflorescence is a short few-flowered cymose panicle, sparsely and inconspicuously pubescent, becoming glabrescent, up to 6(-8) cm. long, with a slender peduncle up to 4 cm. long. The flowers are large, measuring almost 5 mm. long and 12 mm. in diameter, the tube short, the lobes thick, fleshy, elliptic, up to 4.25 mm. or more long. The two outer series of stamens are \pm 1.9 mm. long, with anthers ovate, obtuse, borne on stout filaments one-quarter the length of the stamens. The connective is well developed, about one-third the entire length of the anther. The stamens of the third series are more or less oblong, bearing at the base of the filaments two sprawling somewhat depressed sessile glands that are about the height of the filaments, only wider. The staminodia are ovate, \pm 0.8 mm. long, borne on pubescent stipes slightly more than half the entire length. The glabrous gynoecium is \pm 2.7 mm. long, the depressed-globose ovary twice the length of the rather stout style which bears a triangular slightly decurrent flat stigma. The only fruiting material cited does not exactly match the remainder of the specimens in foliage-characters. The leaves are shorter, more narrowly elliptic, and are definitely caudate. The fruit is lacking on the specimen, but the subtending cupule (seemingly immature) is smooth, purplish, very shallow, about 7 mm. long and 7-8 mm. in diameter at the apex; the long pedicel is 1.5 cm., smooth and expanding to join the cupule with no visible line of demarcation. The young fruits are very similar to those of *N. savannarum*, but the flowers on the same branch show the characters of *N. Brenesii*.

The same reason may be given for transferring this species from *Ocotea* to *Nectandra* that is offered in the case of the next, *Phoebe ambigens*. I am at a loss to suggest the true affinity of this species.

4. *Nectandra ambigens* (Blake), comb. nov.

Phoebe ambigens Blake in Contr. U. S. Nat. Herb. 24: 3, pl. 2. 1922; Record in Trop. Woods 10: 21. 1927; Standley in Trop. Woods 21: 719. 1930.

DISTRIBUTION: Eastern Guatemala and Honduras.

GUATEMALA: Without locality, *Kuylen G.54* (1) (Y 8885) (sterile, Y); Hopi Farm, *Kuylen G.149* (Y 10508) (fl., NY, Y). Izabal: Las Playitas, *Whitford & Stadtmiller* 32 (sterile, GH). San Marcos: Finca El Porvenir, on Potrero Matasán along Rio Cabús, Volcán Tajumulco, *Steyermark* 37643 (fr., Ch). HONDURAS: Copán: Rodezno, *Whitford & Stadtmiller* 7 (fl., ISOTYPE, GH, Y). Colón (?): El Limón, *Whitford & Stadtmiller* 26 (sterile, Y).

NATIVE NAMES: "Aguacatillo" (Guatemala); "Ajio," "Guambo" (Honduras).

This species has branchlets that are finely and sparsely grayish-pubescent, becoming glabrous, and angled, becoming grayish-striate. The leaves have stout petioles 2 (-2.8) cm. long and sparsely pubescent to glabrescent. The blades are subcoriaceous, shining above and beneath, usually elliptic, cuneate at the base, obtuse or shortly obtusely acuminate, 9.5-26 cm. long and 3.5-10 cm. broad. The thick costa and lateral nerves, of which there are 7 or 8 (-9) pairs diverging at an angle of about 45° , are slightly elevated above and more so beneath. Blake mentions axillary tufts being frequently present, but on the material at hand they are almost imperceptible. The dense and prominent reticulation on both surfaces of the leaf is one of the most striking characteristics of the species. The glabrescent inflorescence is axillary, few-flowered, up to 15 cm. long, the stout peduncle up to 7.5 cm. long. The most arresting feature of the species is the presence of large flowers up to about 8 mm. long and 15 mm. in diameter at anthesis, densely grayish-pubescent without, the spreading lobes bright-castaneous at anthesis, and subtended by a slender pubescent pedicel up to 9 mm. in length. The tube is short, the lobes broadly elliptic, up to 7 mm. long and about 5 mm. broad, fleshy and papillose within. The stamens of the two outer series are ± 2.5 mm. long, the almost quadrate anthers are rounded at the apex and nearly sessile. Those of the inner series measure nearly 3 mm. long, the anthers square, truncate at the apex, the filaments nearly half the entire length and bearing near the base two conspicuous subglobose sessile glands. The staminodia are ovate, sub-sessile (in the type), and ± 1.25 mm. long. The glabrous gynoecium is ± 2.15 mm. or more long, the depressed-globose ovary equalling in length the stout style topped by a broad conspicuous subtriangular decurrent stigma. The Steyermark specimen from Guatemala shows a large fruit which is green (probably not fully ripe), ellipsoid, apiculate, the entire apex conspicuously smooth, 2.5 (-3) cm. long and 1.7 cm. broad, subtended by a sharply lobed woody verrucose cupule 1 cm. long, over 2 cm. in diameter, and 8-9 mm. deep. The enlarged pedicel is 1.5 cm. long, expanded to nearly 1 cm. diameter at the apex.

Kuylen G. 149, from Guatemala, shows staminodia that are more stipitate than those of the type, but in other respects it matches the type-material. In spite of the presence of staminodia, the other characters of the flower indicate that *Nectandra* is the genus to which the entity belongs. The large flower recalls that of *N. globosa*, but the anthers have a less developed connective, and the style is longer. Also the foliage-characters are entirely different.

5. *Nectandra rubriflora* (Mez), comb. nov.

Ocotea rubriflora Mez in Jahrb. Bot. Gart. Berlin 5: 279. 1889; Standley in Contr. U. S. Nat. Herb. 23: 296. 1922.

Ocotea perseifolia Mez & J. D. Smith in Bot. Gaz. 20: 10. 1895; Standley in I. c.

Ocotea persicifolia Mez & J. D. Smith, in Index Kewensis, Suppl. I. 1906, sphalm.

DISTRIBUTION: Eastern Mexico, Guatemala, and British Honduras, at low altitudes, from 20 to 60 m.

MEXICO: Oaxaca: Chiltepec and vicinity, Tuxtepec, in llanos, *Martínez-Calderón* 49, 469 (fl., A). Tabasco: Teapa, *Linden* in 1840 (fl., photo. of TYPE of *Ocotea rubriflora*, Ch); San Sebastian, *Rovirosa* 475 (fl., Ch). GUATEMALA: Izabal: Izabal, alt. 36 m., April, 1889, *J. D. Smith* 1807 (fl., isotype of *Ocotea perseifolia*, US). BRITISH HONDURAS: Stann Creek: Middlesex, along river-bank, *Schipp* 381 (fl., Ch, GH, NY).

This species has branchlets that are angled and clothed with a close short pubescence which verges on a ferruginous shade, or perhaps more tan. The leaves are borne on petioles up to 3 cm. long, canaliculate and glabrescent. The blades are chartaceous to subcoriaceous, broadly elliptic or oblong-elliptic, roundish to obtuse or even cuneate at the base, acuminate to shortly acuminate or subcaudate at the apex, up to 26 cm. long and up to 12 cm. broad, shining above, glabrous or very minutely and inconspicuously pubescent beneath, greenish brown throughout in the dried state. The costa is conspicuous though impressed above, frequently slightly pubescent toward the base on both surfaces, and very prominently elevated beneath. The 10-12 pairs of lateral nerves are often reddish, only slightly elevated above but more so beneath, and diverge from the costa at an angle of about 45° or occasionally 60°. The reticulation of the blade is loose, prominent above and beneath. The inflorescence consists of axillary or subterminal panicles 9 (-15) cm. long, clothed with the same minute pubescence that covers the branchlets, and borne on a stout peduncle 4 (-9) cm. in length. The flowers, usually with a reddish tinge, are large, up to 4.5 mm. in length and 8-9 mm. in diameter, the ovate obtuse perianth-lobes fleshy and papillose, \pm 3-3.8 mm. long. The stamens are \pm 1.25 mm. long, and the anthers are thick, papillose, square or parabolical, with the apex often emarginate, borne on stout very short filaments pubescent at the base. The filaments of the inner series of stamens bear at the base sessile glands, which are seemingly compressed-subreniform or subglobose. No staminodia are present. The glabrous gynoecium is \pm 1.7 (-2.15) mm. long, the ellipsoid or subglobose ovary topped by a very short stout style with a subcapitate stigma at its apex. No fruit is known.

The species resembles superficially *N. Lundellii*. The flowers of *N. rubriflora*, as the name indicates, are usually reddish, whereas those of *N. Lundellii* are white and, the collectors note, very fragrant. The squarish stamens — more or less petaloid and densely papillose — present a further distinguishing character.

6. *Nectandra Schippii*, sp. nov.

Arbor 10.5 m. alta, ramis griseis glabris, ramulis dense ferrugineo-tomentosis. Folia alternata subverticillata, juventute utrinque ferrugineo-tomentosa, petiolis robustis ferrugineo-tomentosis, ad 5-10 (-15) mm. longis et 2.5 mm. latis, laminis supra glabris costa et nervis exceptis, subtus ferrugineo-tomentosis, coriaceis, in sicco viridescenti-brunneis, ellipticis, (6-) 12-14 cm. longis et (2.5-) 5 (-6) cm. latis, basi acutis, rotundatis, vel subcordatis, apice subobtusis vel rotundatis et emarginatis, saepe longe vel abrupte acuto-acuminatis, penninerviis, costa supra satis impressa et pubescente, subtus conspicuissime elevata et ferrugineo-tomentosa, nervis (6-) 8- vel 9-paribus supra impressis subtus elevatis et pubescentibus, angulo 45°

divergentibus, rete venularum supra satis impresso subtus elevato et pubescente. Inflorescentia axillaris, juvenili bracteis adhuc onusta, ad 6.5 cm. longa, ferrugineo-tomentosa, cymoso-paniculata, pauciflora, longipedunculata, pedunculo ad 4.5 cm. longo. Flores leviter fragrantes, immaturi, pedicellis brevibus pubescentibus, perianthio albo, lobis crassis, papilloso-tomentosis; staminibus ser. I & II subreniformibus apice rotundatis filamentis crassis et latis brevibus, ser. III subreniformibus biglandulosis, glandulis magnis sessilibus antheris aequalibus; staminodiis brevistipitatis bene conspicuis; gynaecio glabro, ovario stylo duplo longiore, stigmate parvo inconspicuo. Fructus ignotus.

DISTRIBUTION: Known only from the type-locality.

BRITISH HONDURAS: Stann Creek: Rare in dense shade on bank along Big Creek, alt. 30 m., Dec. 3, 1931, Schipp 856 (fl., Ch, TYPE—GH, NY) (tree 10.5 m., diam. 23 cm., wood cream-colored, close-grained; flowers white, slightly fragrant).

The flower-structure of this species is very similar to that of *N. globosa*. The branchlets, however, with their dense conspicuous woolly covering of ferruginous-tomentose pubescence, differ widely. The bright tomentum after a period wears off to a thin rather straggling layer of grayish inconspicuous pubescence that dwindle to a mere glabrescent state. The fragrant flowers resemble those of *N. globosa*.

7. *Nectandra Austinii*, sp. nov.

Arbor 7.5–13 m. alta, ramulis valde sulcatis fulvo- vel pallide brunneotomentosis. Folia alternata, juventute utrinque dense fulvo-tomentosa vel brunneo-tomentosa, petiolis robustis tomentosis canaliculatis, 1–2 cm. longis et ad 4 mm. latis, laminis supra glabris basi costae excepta, subtus hinc inde consperso-pubescentibus nervatione dense fulvo-pubescentibus, coriaceis, in sicco supra pallide olivaceis, subtus atro-brunnescentibus, obovatis, 13 (–22) cm. longis et 7 (–12.5) cm. latis, basi cuneatis saepe obliquis, interdum obtusis, apice rotundatis vel obtusis vel leviter breviterque obtuse acuminatis, penninerviis, costa supra leviter impressa subtus leviter elevata, nervis plerumque 7-paribus supra leviter impressis subtus leviter elevatis angulo (35–) 45 (–55)° divergentibus, rete venularum supra obscuru subtus conspicuo atrato-pubescente delineato. Inflorescentia axillaris anguste paniculata, 4–8 cm. longa, dense fulvo-tomentosa, pauciflora, longipedunculata, pedunculo ad 4 cm. longo satis gracili. Flores immaturi, ad 4 mm. longi, glabri, pedicellis brevibus ad 1 mm. longis pubescentibus, gracilibus, perianthio subcampanulato(?), lobis ellipticis nonnihil crassis glabris \pm 2.15 mm. longis, staminibus ser. I & II \pm 1 mm. longis, antheris subsessilibus, connectivo conspicuo truncato, ser. III \pm 1.25 mm. longis, filamentis brevibus biglandulosis, glandulis parvis staminis partem tertiam aequantibus; staminodiis lanceolatis brevibus \pm 0.5 mm. longis; gynaecio glabro \pm 1.7 mm. longo, ovario ellipsoideo stylo duplo longiore, stigmate conspicuo. Fructus immaturus (?) viridis, oblongus vel oblongo-obovatus, 2.5–4 (fide coll.) \times 1–1.5 cm., cupula hemisphaerica rubra rugosula glabra, ad 1 cm. longa et diam. et ad 5 mm. alta subtentus, pedicello incrassato glabro aciculato, ad 7 mm. longo et ad 3 mm. lato.

DISTRIBUTION: Known only from the cloud-forests of Alajuela in Costa Rica, at an altitude of 1600–2345 m.

COSTA RICA: Alajuela: Alfaro Ruiz, La Peña, A. Smith P.2114 (fl., A); Tapeseo,

in mold and loam in half-shade in Caribbean cloud-forest, alt. 1650 m., Jan. 6, 1940 *Austin Smith P.2226* (fl., type, A) (tree 11 m., trunk base 38 cm.; bark neutral-brown with raised dots; crown broad; leaves chartaceous, thickened, subrigid, opaque green, paler below with fine reticulation; drupe green, fig-form); region of Zarcero, *A. Smith A.240* (fr., Ch).

The new species superficially has characters in common with *N. sinuata*, but the flowers are smaller and more delicate, with their anthers truncate and the ovary glabrous; the leaf-blades are less densely tomentose and their bases are not cordate or conspicuously rounded.

8. *Nectandra panamensis* Mez in *Jahrb. Bot. Gart.* Berlin 5: 443. 1889.

DISTRIBUTION: Central part of Panama, at 30-100 m. altitude.

PANAMA: Canal Zone: Near Gorgona and Maume, *Wagner s.n.* (fl., photo. of type, GH); Darién, *MacBride 2703* (fr., Ch, Mo). Panama: Around Alhajuela, Chagres Valley, forests, on dry limestone, *Pittier 2398* (fl., Ch, GH, NY); vicinity of Pacora, *P. H. Allen 1126* (fl., Ch, GH, Mo), *2033* (fl., A).

The branchlets of this species are glabrous with only a faint suspicion of pubescence at the apex, greenish, becoming brownish, angled, becoming terete and striate. The leaves have glabrous canaliculate petioles up to 1 cm. long. The blades are membranaceous or chartaceous, pale greenish in the dried state, glabrous, narrowly elliptic or elliptic-lanceolate, the base cuneate, the apex acutish or subacuminate or often obtusely long-acuminate, 15-20 cm. long and not more than 5.5 cm. broad. The costa is plane above, though conspicuous because of its yellowish color, and is elevated beneath. The lateral nerves, of which there are 5-7 (-9) pairs, are yellowish and slightly elevated above but more conspicuously so beneath, diverging at an angle of 25-35 (-45)° and usually bearing in their axils very conspicuous large ellipsoid pubescent glands which are conspicuous on the upper surface of the blade as well. The glabrescent paniculate axillary or subterminal inflorescence is up to 12 (-19) cm. long, much-branched near the base, with a very short peduncle. The white flowers are pubescent, and measure about 3.5 mm. long and up to 8 mm. in diameter, the slender pedicel up to 4 (-6, according to the author) mm. long. The perianth-lobes are fleshy, hairy, and up to 3 mm. long. The two outer series of stamens are ± 0.8 mm. long, the anthers are broadly ovate, obtuse or somewhat depressed-globose, the connective tissue is apparent, and the filaments are very short and thick. The stamens of the inner series are ± 1.25 mm. long and consist of subrectangular anthers that are broader than long and borne on rather stout filaments with two conspicuous sessile basal glands that are almost larger than the anthers themselves. The staminodia are very thin, ovate, ± 0.6 mm. long, the stipe about equalling half the entire length. The glabrous gynoecium is ± 1.7 mm. long, the ovary ellipsoid with a very short stout style topped by a conspicuous triangular stigma. The fruit (probably immature) is borne in a cyathiform cupule up to 6 mm. long, 9 mm. in diameter, and 4 mm. deep. The supporting pedicel is up to 5 mm. long and scarcely broader at the apex than at the base.

The species is reminiscent of *N. Gentlei*, also to be found in this area. The leaf-shape, however, and the type of venation distinguish it from the above-mentioned species. There are points of difference between the species-description and the specimens cited, but I can find no major features which bar the numbers from inclusion in Mez' species.

9. *Nectandra globosa* (Aublet) Mez in Jahrb. Bot. Gart. Berlin 5: 415. 1889, excl. syn.
Laurus globosa Aublet, Pl. Guian. 1: 364. 1775.
Sassafridium macrophyllum Rose in Contr. U. S. Nat. Herb. 1: 355. 1895.

DISTRIBUTION: West Indies, Mexico, and Central America.

MEXICO: Sinaloa: San Ignacio, Arroyo del Agua Colgada, *Ortega* 715 (fl., Ch.). Nayarit (Tepic): Santiago, *Lamb* 614 (fl., GH). Colima: Manzanillo, *E. Palmer* 1033 (fl., isotype of *Sassafridium macrophyllum*, GH, NY). Guerrero: Banks of the Río Tecpán, *Langlassé* 740 (fl., GH). Oaxaca: Tuxtepec, Chiltepec, and vicinity, in llanos, *Martínez-Calderón* 292 (fl., A); Pinotepa to Jamiltepec, *Nelson* 2347 (fl., GH); Jamiltepec, *Conzatti* 4404 (fl., NY). GUATEMALA: Without locality, *Brigham* s.n. (fl., GH). Petén: Above El Cambio, along Río Cancuen, between La Concordia and El Cambio, *Steyermark* 45892 (fl., Ch.). Alta Verapaz: Cubilgüitz, *von Tuerckheim* 7964 (fl., GH, NY); wet wooded ravine, along Río Carchá, between Cobán and San Pedro Carchá, *Standley* 89878 (fl., Ch.), at edge of river, 90010 (fl., Ch.). Izabal: Near mouth of Río Polochic, *Maxon & Hay* 3788 (fl., NY), *von Tuerckheim* 1222 (fl., NY). Guatemala: *Aguilar* 499 (fr., Ch.). Chimaltenango: Iztapa, *J. R. Johnston* 1169 (fl., Ch.). Retalhuleu: In wet thicket, *Standley* 66695 (fl., Ch.). Suchitepéquez: Vicinity of Mazatenango, stream-bank, *Maxon & Hay* 3477 (fl., Ch.); near Santo Domingo, south of Mazatenango, stream-bank, *Standley* 88900 (fr., Ch.). Escuintla: Concepción, *J. D. Smith* 2095 (fr., GH); Escuintla, *Hayes* s.n. (fl., GH); south of Río Burrión, northeast of Escuintla, road-side, *Standley* 89626 (fr., Ch.). Santa Rosa: Río de La Plata, *Heyde & Lux* 4261 (fl., GH, NY); about Guazacapán, in damp forest, *Standley* 78677 (fl., Ch.); wet forested quebrada, Río de la Cruz, east of Taxisco, *Standley* 79005 (fl., Ch.); road-side, region of Capulín, south of Los Cerritos, on road to El Ahumado, *Standley* 79623 (fl., Ch.). HONDURAS: Tegucigalpa: Mont. de la Flor, river-bank in pine-region, *C. & V. W. von Hagen* 1135 (sterile, NY). Yoro: Near Progreso, Farm 42, *Hottle* 85 (fl., Ch.), 106 (fl., Ch.). BRITISH HONDURAS: Toledo: "Forest Home," Punta Gorda, in open pasture, *Schipp* 1037 (fl., GH, NY); forest, Moho River, *Peck* 553 (fl., GH); Temash River, *Stevenson & Smart* 126, 130 (Y 19785) (fl., Ch., Y). EL SALVADOR: Ahuachapán: Vicinity of Ahuachapán, *Standley* 19883, 20280 (fl., GH). Sonsonate: Vicinity of Izalco, *Standley* 22225 (fl., GH, NY). La Libertad: Santa Tecla, *S. Calderón* 1419 (fl., GH, NY). Usulután: Triunfo, *Shannon* 5003 (fl., GH). NICARAGUA: Chinandega: Chinandega, *Baker* 2015 (fl., Ch., GH, NY). COSTA RICA: Guanacaste: Near Nicoya, *Tonduz* 13806 (fl., GH), *Valerio* 495 (fr., Ch.). Puntarenas: Santo Domingo, *Tonduz* 7153 (Herb. Nat. Costa Rica 10047) (fl., GH); between Puerto Jiminez and Santo Domingo, *Brenes* 12278 (757) (fr., Ch.). Alajuela: Cataracts of San Ramón, *Brenes* 13664 (fl., Ch.); Alajuela, *J. D. Smith* 6755 (fl., GH); in forest of Pacific tropical zone, Atenas, *A. Smith* 2465 (fl., A). San José: Vicinity of El General, *Skutch* 3836 (fl., A, NY). PANAMA: Without locality, *Hayes* 1021 (fl., NY), *Mell* s.n. (fr., NY). Bocas del Toro: Changuinola Valley, *Dunlap* 215 (fl., Ch.), *Cooper & Slater* 86 (Y 10267) (fl., Ch.). Chiriquí: San Felix, *Pittier* 5145 (fl., Ch.). Coclé: Above Penonome, *R. S. Williams* 257 (fl., NY), 319 (fl., fr., NY), 530 (fl., NY). Canal Zone: Gatun Lake, near laboratory, *Wetmore & Abbe* 17 (A, Ch., GH), 43 (fl., A, Ch., GH), 314 (fl., A, Ch.); alluvial bottom near Bohio, *Maxon* 4772 (fl., Ch.); vicinity of Miraflores Lake, *G. White* 191 (fl., Ch., GH), *P. White* 276 (fl., Ch., GH); between Miraflores and Corozal, *Pittier* 2495 (fl., NY); near lake, vicinity of Cocoli River, *P. White* 95 (fr., Ch., GH, Mo); Barro Colorado Island, *M. Brown* 40, 68, 72, 188 (fl., Ch.), *Shattuck* 314, 458, 807 (fl., Ch.), *C. L. Wilson* 2 (fl., Ch.); along Río Fató, in forests and thickets, *Pittier* 3873 (fr., NY). Panama: Vicinity of Arraijan, *P. H. Allen* 1622 (fl., Ch., GH, Mo, NY); Chepo, *Kluge* 27 (fl., Ch.). Darién: Chepigana, Tucuti, *M. E. & R. A. Terry* 1391 (fl., A, Ch., Mo).

NATIVE NAMES: "Aguacate del monte" (El Salvador); "Aguacatillo" (Mexico, Honduras, British Honduras, Costa Rica); "Canelon" (El Salvador); "Quizarrá," "Quizarrá quina" (Costa Rica); "Sangre blanco" (Honduras); "Sweetwood" (Panama); "Timbersweet," "Wild Pear" (British Honduras).

This species, as it occurs in Mexico and Central America, has branchlets that are closely and minutely subferruginous-pubescent, in the early stages angled and flattened at the nodes, later becoming reddish brown, striate, and glabrous. The leaves are borne on stout petioles up to 1.5 cm. long, minutely pubescent to glabrous and canaliculate. The blades are coriaceous, shining above and dull beneath, with obscure reticulation, early minutely pubescent, becoming glabrescent to glabrous, elliptic to oblong-elliptic, the base rounded or sharply cuneate, the latter appearance due to the lower centimeter of the leaf-base being recurved, the apex long-acuminate. The costa is slightly impressed above and rather conspicuous and elevated beneath. The lateral nerves are inconspicuous above and slightly elevated beneath, numbering 8-12 pairs and diverging at an angle of 30-45°, frequently bearing pubescent glands in their axils. The stout paniculate inflorescence measures up to 20 cm. long, is minutely subferruginous-pubescent to glabrescent, many-flowered, usually widely branching, the peduncle varying from very short to 8 cm. in length. The flowers are very large and conspicuous, up to 12 mm. in diameter, with reflexed lobes that are very fleshy, papillose within and pubescent without, 4-5 mm. long, elliptic or obovate-elliptic, acutish or obtuse at the apex. The two outer series of stamens are ± 1.25 (-1.5) mm. long, with the sessile or sub-sessile anthers rounded or broadly rounded-ovate, the fleshy papillose connective often one-third the entire length. The stamens of the inner series are ± 1.7 mm. long, the broad anthers narrowing slightly into thick filaments almost one-half their length and bearing at the base two conspicuous spreading sessile glands almost the length of the anthers. The almost triquetrous staminodia are ± 1 mm. long, the thick stipe nearly one-half the entire length. The glabrous gynoecium measures ± 1.7 mm. long, the sub-globose ovary two-thirds the entire length. The short style is topped by a triangular discoid or obtuse stigma. The globose apiculate fruit, about 1 cm. in diameter, is subtended by a very shallow cupule up to 2 mm. long, 8 mm. in diameter, and 2 mm. deep, with the margin usually entire and thin. The pedicel is up to 5 mm. in length and expanded to 3 mm. in diameter at the apex.

It is not certain at the present moment that *N. globosa* is the correct binomial for the species involved. Kostermans (Meded. Bot. Mus. Utrecht 25: 19, 54. 1936) believes that Aublet's name *globosa* should replace *N. antillana* of Meissner, the West Indian entity not occurring in Surinam, and that Mez' *N. globosa* should be reduced under *N. Pisi*. Until types are available for study, the species from Mexico and Central America may continue to go under the name of *N. globosa*.

There can be no doubt that *Sassafridium macrophyllum* Rose belongs with this species. The earlier described *Sassafridium veraguense* is an *Occotea*.

10. *Nectandra ramonensis* Standley in Field Mus. Publ. Bot. 18: 453. 1937.

DISTRIBUTION: Costa Rica and adjacent Panama.

COSTA RICA: Alajuela: Near San Ramón, *Brenes* 353 (478) (fl., Ch); San Pedro de San Ramón, on the side toward San Francisco, *Brenes* 6612 (478) (fl., Ch); on the trail to San Francisco, *Brenes* 6660 (fl., Ch); San Francisco and San Pedro de San Ramón, Feb. 7, 1933, *Brenes* 17018 (fl., TYPE, Ch); Río Jesús de San Ramón, *Brenes* 14988 (fl., Ch); La Calera de San Ramón, on the trail to La Calera, *Brenes*

21990 (fl., Ch); between Santiago and San José de San Ramón, *Brenes* 6834 (fr., Ch); La Palma de San Ramón, *Brenes* 6819 (fl., Ch). PANAMA: Prov. unknown, Sabana de la Tortuga, *Pittier* 3307 (fr., Ch). Chiriquí: Boquete, *Davidson* 566 (fl., Ch, Mo). Coclé: Vicinity of El Valle, *P. H. Allen* 1635 (fl., Ch, GH, Mo, NY); north rim of El Valle, *Alston* (*Allen?*) 1858 (fr., Ch, GH, Mo, NY).

This species is very close to *N. globosa*, occurring insofar as is known at present in Costa Rica and Panama. A similar pubescence clothes the young branchlets and leaves. The branchlets however at maturity are usually grayish, the outer cortex sometimes flaking off to reveal a dark reddish brown color. The leaves are subtended by short slender pubescent petioles less than 1 cm. long. The blades are sericeous beneath in the early stages, later becoming minutely pubescent. The adult leaf-blades are shining above, dull beneath, elliptic, occasionally oblong-elliptic, the base obtuse and/or the lowermost portion attenuately cuneate, frequently almost decurrent and recurved. The apex is obtuse to acutish or acuminate, the costa and lateral nerves slightly impressed above and somewhat obscure, slightly elevated beneath. The lateral nerves number not more than 4 or 5 pairs, diverging from the costa at an angle of 35–45° and bearing pubescent glands in their axils. The inflorescence consists of fewer-flowered axillary or subterminal panicles minutely subferruginous-sericeous-tomentellous and up to 8 cm. long at most, with long stout peduncles frequently up to 6 cm. long. The flowers are similar to those of *N. globosa* in structure. The fruits are ellipsoid rather than globose, 1.5 cm. long and 9 mm. in diameter, subtended by deeper cupules 4–5 mm. long, 8–10 mm. in diameter, and 2–3 mm. deep. The pedicel is about 5 mm. long and 3–4 mm. in diameter at the apex.

11. *Nectandra Heydeana* Mez & J. D. Smith in *Bot. Gaz.* 19: 262, t. 25. 1894; Standley & Calderón, *Lista Prelim. Pl. Salvador* 84. 1925.

DISTRIBUTION: Guatemala and Honduras, at 900–1360 m. altitude.

GUATEMALA: Alta Verapaz: Along Río Carchá, near San Pedro Carchá, *Standley* 92158 (fl., Ch). Santa Rosa: Santa Rosa, alt. 900 m., Nov. 1892, *Heyde & Lux* 4260 (fl., ISOSYNTYPE, GH, NY), Jan. 1893, *Heyde & Lux* 4578 (fl., ISOSYNTYPE, GH, NY). HONDURAS: Tegucigalpa: Along river, Mont. de la Flor, Guarabuqui, *C. & V. W. von Hagen* 1275 (fr., Ch, NY).

NATIVE NAME: "Aguacatilla" (Honduras).

The present species, so little collected to date, has branchlets which are early close fulvous-pubescent, later glabrescent, angled, becoming striate. The leaves are borne on slender petioles up to 2 cm. in length which are subcanaliculate and fulvous- or grayish-pubescent. The blades are glabrous except for the pubescent axillary glands beneath, elliptic, sometimes oblong-elliptic, the base cuneate or obtuse or even almost rounded, the apex abruptly acuminate or obtuse, up to 19 cm. long and to 8 cm. broad. The costa is impressed and conspicuous above and the lateral nerves, of which there are usually 7 or 8 pairs, are very slightly elevated and conspicuous above, whereas both are conspicuously elevated beneath. The lateral nerves diverge from the costa at an angle of 35–45°, and the reticulation is prominent throughout. The axillary inflorescence is few-flowered, glabrous, paniculate, up to 7 cm. long, and is borne on a slender peduncle up to 5 cm. long. The flowers are large, almost 4 mm. long and up to 7 mm. in diameter, the slender filamentous pedicels glabrous and up to 5 mm. long. The broadly elliptic lobes are rather fleshy, ±3.8 mm. long, and papillose

on the inner surface. The stamens of the two outer series are ± 1.25 mm. long, with anthers that are almost square or broadly ovate, truncate, nearly sessile, sometimes mucronate. Those of the inner series are ± 1.7 mm. long, the squarish anthers somewhat emarginate, the two upper cells definitely lateral. The filaments are one-half as long as the anthers and bear laterally at the base two broad spreading glands about half their length and twice as broad as long. The staminodia are ovate, ± 0.6 mm. long and densely shaggy-pubescent. The glabrous gynaecium is $+ 2.5$ mm. long; the subglobose or broadly ovoid ovary is not quite twice the length of the style with its almost peltate conspicuous stigma.

The fruit of the Honduran specimen is ellipsoid, greenish black in the dried state, up to 2.5 cm. long and 1.8 cm. broad, subtended by a shallow woody flaring cupule not more than 6 mm. long, 1 cm. in diameter, and less than 3 mm. deep. The expanded pedicel, also woody, reaches a length of 9 mm. and a breadth of 5 mm. at its apex.

The species may be said to show a slight relationship to *N. Woodsoniana*, but the grayish pubescence of the many-flowered inflorescence of the latter separates it immediately. The fruits of the two species are entirely different, that of *N. Woodsoniana* being much smaller and with a more shallow cupule.

12. *Nectandra Gentlei* Lundell in *Contr. Univ. Mich. Herb.* 6: 13. 1941.

DISTRIBUTION: Southern Mexico, Guatemala, Honduras, British Honduras, and Panama.

MEXICO: Oaxaca: Ubero, *L. Williams* 9377 (fr., A, Ch, NY). GUATEMALA: Petén: La Libertad, *Lundell* 2578 (fr., Ch, NY). Huehuetenango: Wooded slopes bordering Río Lacandon, between Ixcán and Río Ixcán, Sierra de los Cuchumatanes, *Steyermark* 49354 (fl., Ch). Alta Verapaz: Cubilgütz, *von Tuerckheim* 8578, 8579 (fl., GH, NY); woods between Finca Cubilgütz and Hacienda Yaxcabanal, *Steyermark* 44827 (fr., Ch); wet forest, above Tamahú, *Standley* 70932 (sterile, A). BRITISH HONDURAS: Belize: Forest near Manatee Lagoon, *Peck* 196 (fl., GH). Stann Creek: Mullins River, in high ridge on river-bank, *Gentle* 3456 (fl., ISOTYPE, A, NY); Middlesex, *Schipp* 337 (fl., Ch, GH, NY); Stann Creek Railway, 10 mile, *Schipp* 164 (fr., GH, NY). Toledo: In forest, *Peck* 574 (fl., GH). HONDURAS: Near Puerto Sierra, *P. Wilson* 558 (fr., Ch, GH, NY). PANAMA: Province unknown, Cana and vicinity, *R. S. Williams* 797 (fr., NY). Chiriquí: El Pedregal de David, *Pittier* 5117 (fl., Ch). Coclé: Above Penonome, *R. S. Williams* 617 (fr., NY). Canal Zone: Vicinity of Miraflores Lake, *P. White* 243 (fl., Ch, GH, Mo); Ancon Hill, *Killip* 3032 (fl., Ch), *Standley* 26376 (fr., GH); near Quarantine Station, *Pittier* 2076 (fr., Ch); Hospital Grounds, *Pittier* 2733 (fr., GH); between Corozal and Ancon, *Pittier* 2639 (fr., NY); Balboa, hillside, west side of Canal, *Rowlee & Stork* 987 (fl., NY). San José Island: Perlas archipelago, Gulf of Panama (about 55 miles SSE of Balboa), *Johnston* 82 (fl., A), 221 (fl., A), 270 (young fr., A), 521, 699, 716 (fr., A).

This species has angled branchlets that early are covered with a close short subtomentellous pubescence of a pale ferruginous or brownish color, presently becoming fuscous, and eventually the branchlets being glabrescent to glabrous, dark reddish brown, and striate. The leaves are supported by petioles up to 1.5 cm. long, canaliculate, and brown-tomentellous. The chartaceous lanceolate leaf-blades appear cuneate at the base but actually are rounded or even subauriculate, the extreme bases being usually tightly recurved. The apex of the blade is attenuate into a slender acumen which may or may not be caudate. The blades measure up to 20 cm. long and to 4.5 (–5) cm. broad, the broadest part of the blade being at or below the middle. The blades are early sericeous throughout, but soon become gla-

brescent to glabrous above, remaining shortly but persistently pubescent beneath. The costa and lateral nerves alike are slightly impressed and rather inconspicuous above, being prominently elevated beneath. The lateral nerves number 4-6, occasionally 7 or 8, and diverge arcuately from the costa at an angle of about 45°. At a distance of 1-1.5 cm. from their origin they ascend abruptly and follow the outline of the leaf almost parallel with the midrib. The inflorescence is axillary, paniculate, subferruginous- or brown-tomentellous, becoming glabrescent, measuring up to 8 (-12) cm. in length, the peduncle reaching a length of 4 (-6) cm. The flowers are yellow or white, sometimes fragrant, up to 3 mm. long and 5.5 mm. in diameter, the perianth-tube being well defined, constricted at the apex, and about 1 mm. long. The lobes are usually elliptic, ± 1.7 (-2.15) mm. long, rather thick and papillose at the tip. The stamens of the two outer series are ± 0.6 -8 mm. long, the anthers subreniform-globose, almost sessile. Those of the inner series are ± 0.8 (-1) mm. long, with almost square anthers slightly emarginate, with large conspicuous and contiguous glands borne at the base of the short filaments. The slender, stipitate, often pubescent staminodia are variable, lanceolate, oblanceolate, or even ovate. The glabrous gynaecium is ± 1.7 mm. or less long, the style slightly longer than the ovoid ovary, and topped by a conspicuous triangular slightly decurrent stigma. The fruit is subglobose, about 8 mm. in diameter, glabrous and black at maturity. It is subtended by a thin shallow cupule not more than 3 mm. long, 6 mm. in diameter, and usually less than 2 mm. deep, glabrous and with an entire margin. The pedicel is less than 5 mm. long and expanded at the apex to about 2 mm. in diameter.

Nectandra Pichurim (H.B.K.) Mez, in which Mez included *N. cuspidata* Nees, was interpreted by him to include specimens collected from Mexico south to Brazil and Venezuela. Kostermans (Meded. Bot. Mus. Utrecht 25: 21. 1936) believes *N. cuspidata* to be distinct from *N. Pichurim* because of the difference in the type of pubescence, the number of primary nerves, the cupule-shape, etc. It is my belief that the Mexican and Central American entity is to be separated from *N. cuspidata* also on floral characters as well as foliage. The apex of *N. cuspidata* is attenuate but always obtuse. Further collections may show an intergradation of all of these characters. *Nectandra membranacea*, from the West Indies, has also been confused with the species under discussion. A glance at the original description of the latter immediately precludes the possibility of their being identical, for Grisebach gives the leaf-blades as ovate-oblong or elliptic with an abruptly acuminate apex. The texture of the leaf and the recurved base recall *N. globosa*, but the small flowers separate it at once from the latter.

13. *Nectandra Woodsoniana*, sp. nov.

Arbor 7-15 m. alta, ramulis breviter adpresso fulvo-tomentellosis, mox glabrescentibus brunnescensibus demum angulatis striatis glabris griseis. Folia alternata, petiolis plus minusve atris ad 1.5 (-2) mm. longis canaliculatis pubescentibus vel glabrescentibus, laminis glabrescentibus vel glabris glandulis axillaribus exceptis, in sicco griseo-viridibus, ellipticis vel oblongo-ellipticis, ad 24 cm. longis et 8 cm. latis, basi cuneatis, apice obtusis acutis vel acuminate, pinninerviis, costa supra conspicua leviter impressa subtus

elevata, nervis lateralibus 7 vel 8 (10)-paribus supra leviter subitus valde elevatis angulo 45 vel 35° divergentibus, rete venularum supra leviter subitus conspicue elevato. Inflorescentia axillaris vel subterminalis, ad 20 cm. longa, paniculata, dense et adpresso griseo-pubescentis mox glabrescens, multiflora, pedunculo ad 10 cm. longo. Flores ad 3 mm. longi, pedicellis 2-3 mm. longis pubescentibus, perianthio albo, lobis ellipticis vel ovatis vel anguste obovatis, \pm 2.5 mm. longis, carnosus, intus papillosis, extus pubescentibus; staminibus ser. I & II \pm 0.6-8 mm. longis, antheris subreniformibus filamento robusto duplo longioribus, ser. III \pm 0.9-1.25 mm. longis, antheris quadratis filamentis biglandulosis aequalibus, glandulis antheris longitudine aequalibus; staminodiis \pm 0.6 mm. longis ovatis obtusis stipite robusto dimidio breviore; gynaecio glabro \pm 1.7 mm. longo, ovario ovoideo longitudine \pm 1.7 mm. longo, gynaecii aequante, stylo brevi stigmate discoideo conspicuo. Fructus ad 15 mm. longus et 10 mm. latus, in sicco atro-rubescens, ellipsoideus, cupula vadosa discoidea lignosa, glabra vel glabrescente rugosula, ad 2 mm. longa, 5-6 mm. diam., et 1 mm. alta subtentus, pedicello incrassato striato glabrescente ad 2 mm. longo.

DISTRIBUTION: El Salvador, Costa Rica, and Panama, from an altitude of 1800 m. in Costa Rica to 670 m. farther south, and finally in central Panama as low as 20-90 m.

EL SALVADOR: Ayutuxtepeque, *S. Calderón* 1117 (fl., GH, NY). COSTA RICA: Province unknown, Las Nubes, *Valerio* 1451 (fl., Ch). Guanacaste: Obrededores de Tilarán, *Brenes* 15617 (fl., Ch). Alajuela: Hills about San Pedro de San Ramón, *Brenes* 5826 (fr., Ch), 16824 (fr., Ch), 19203 (fl., Ch); San Francisco de Guadalupe, *Pittier* 11490 (fr., Ch). Limón: Monte Verde, *Stork* 1688 (fr., Ch). San José: Río Virilla, *Brenes* 14296 (fl., Ch); Escasú, *Valerio* 1327 (fl., Ch); vicinity of El General in a bushy clearing, *Skutch* 2634 (fl., GH, NY), 4374 (fl., A, NY); Potrero of Don José, Barrantes near S. Isidro del General, alt. 720 m., June 30, 1932, *Stork* 3059 (fl., TYPE, Ch). PANAMA: Canal Zone: Mamei Hill, *Pittier* 3803 (fl., GH); vicinity of Salamanca Hydrographic Station, Río Pequení, *Woodson*, *Allen* & *Seibert* 1620 (fl., A, Mo, NY).

NATIVE NAMES: "Tepeaguacate" (El Salvador); "Laurel," "Quisarrá" (Costa Rica).

Nectandra Woodsoniana is striking because of its gray-green foliage and long grayish-pubescent inflorescence. The species is very near *N. martinicensis*, from the West Indies, but the latter has leaves that are 18 \times 5.3 cm., the margin of the blades recurved. The filaments are pilose, the anthers depressed-orbicular and slightly papillose, the apex rounded, and there are large staminodia present.

The species is named for Dr. Robert E. Woodson, Jr., whose contributions toward making known the flora of Panama are of the greatest value.

14. *Nectandra Lundellii*, nom. nov.

Persea Gentlei Lundell in Contr. Univ. Mich. Herb. 6: 18. 1941, not *Nectandra Gentlei* Lundell (1941).

Phoebe Gentlei Standley & Steyermark in Field Mus. Publ. Bot. 23: 117. 1944.

DISTRIBUTION: Known only from British Honduras.

BRITISH HONDURAS: Stann Creek: Middlesex, *Hope* 3 (Y 4798) (fl., Ch, Y), *Gentle* 2896 (fl., fr., A, NY), 2949 (fl., A, NY); in Stann Creek Valley on high ridge, March 30, 1940, *Gentle* 3288 (fl., ISOTYPE of *Persea Gentlei*, Ch, NY) (tree 30 cm. in diam.; flowers white, fragrant); Big Eddy Ridge, *Gentle* 3308 (fl., A, NY), 3343 (fr., A). Toledo: In open places on river-bank, Río Grande, *Schipp* 1164 (fr., Ch, GH, NY).

NATIVE NAMES: "Ca'ca'woung," "Timbersweet," "Wild Pear" (British Honduras).

This tree has young branchlets that are densely tawny-sericeous, becom-

ing more darkly pubescent and finally glabrescent with age. The leaves are borne on stout petioles up to 2 cm. long and up to 4 mm. in width. The blades are coriaceous or subcoriaceous, shining above and glabrous, beneath dull and minutely but definitely pubescent at maturity, elliptic or oblong-elliptic, cuneate at the base or obtusely cuneate, the apex usually abruptly acuminate, up to 32 cm. long and to 14.5 cm. broad. The costa is deeply impressed above and thickly and prominently elevated beneath. The 8–13 pairs of lateral nerves are very lightly elevated above and more so beneath and slightly pubescent, diverging from the costa at an angle of about 45–55°. The reticulation is very prominent above and more delicately so beneath. The inflorescence is axillary or subterminal, paniculate, tawny-sericeous, up to 18 cm. long, the stout glabrescent peduncle up to 8 cm. long. The fragrant white flowers are shortly sericeous-tomentose, becoming glabrescent, up to 4 mm. long. The obovate-orbicular lobes are ± 3.5 mm. in length, reflexed at anthesis, thick and papillose. The stamens of the two outer series are ± 0.8 mm. long, the squarish anthers subtended by very short stout filaments. Those of the third series are 1 mm. long, with anthers almost rectangular, about twice the length of the filaments, which bear subsessile conspicuous glands at the base equalling the anthers in size. The staminodia are fairly conspicuous, ± 0.8 mm. in length, the subtriquetrous tips equalling the rather stout stipes. The glabrous gynoecium measures ± 1.25 mm. in length, the globose ovary topped by a nearly sessile rather inconspicuous discoid stigma. The fruit is blackish, ellipsoid, glabrous, up to 2.5 cm. long and 1.3 cm. broad, borne on a flaring irregularly lobed woody glabrous cupule 8–10 mm. long and to 17 mm. in diameter at the apex, and about 5 mm. deep. The supporting pedicel is not more than 5 mm. long and expanded to 4–5 mm. at the apex.

This species is very similar to *N. rubriflora*; for a further discussion of the similarity to that species see the preceding pages. The cupules of the Schipp number are entire and not lobed, and the leaves are less coriaceous, but other than this the specimens match *N. Lundellii*.

15. *Nectandra savannarum* (Standley & Steyermark), comb. nov.

Phoebe savannarum Standley & Steyermark in Field Mus. Publ. Bot. 23: 118. 1944.

DISTRIBUTION: In Guatemala, at an altitude below 400 m. except for the specimens collected in the cloud-forest in Chiquimula, where the altitude is given as 500–1500 m., and mountain-slopes and coastal plains of Honduras and British Honduras.

GUATEMALA: Alta Verapaz: Along stream bordering forest south of savanna between base of Cerro Chinajá at Sachaj and Sacacao, alt. 150–180 m., April 6, 1942, Steyermark 45712 (fl., type, Ch) (tree 9 m.; leaves firmly membranous, deep green and shining above, dull and paler green beneath; flowers white); near the top of wooded ridge, vicinity of Cubilgüitz, 1½–2 miles south of Cubilgüitz, Steyermark 44428 (fl., Ch); south of Cubilgüitz, Steyermark 44499 (fl., Ch). Izabal: Along stream between Milla 49.5 and ridge 6 miles from Izabal, Montana del Mico, Steyermark 38625 (fl., Ch); wet thicket near Puerto Barrios, Standley 73043 (sterile, Ch). Chiquimula: Cloud-forest on top, Cerro Tixixí (Tishishí), 3–5 miles north of Jocotán, Steyermark 31567 (fr., Ch). HONDURAS: Atlántida: On bank of the Danto River, lower slopes of Mt. Cangrejal, back of La Ceiba, Yuncker, Koepper & Wagner 8762 (fl., Ch, NY). BRITISH HONDURAS: Belize: Mullins River Road, Schipp 79 (fl., fr., Ch, GH, NY); Gracie Rock, Sibun River, Gentle 1572 (fl., NY). Stann Creek: Big Eddy River, in high ridge, Gentle 3488 (fl., A).

NATIVE NAMES: "Laurel" or "Lavrel" (Guatemala); "White laurel" (British Honduras).

This species, originally described under *Phoebe*, has slender branchlets early covered with a close brownish pubescence that presently disappears, leaving the branchlets dark brown or eventually grayish. The leaves are borne on slender petioles that are pubescent and slightly canaliculate, reaching a length of 6, rarely 8, mm. The blades are glabrous, chartaceous to subcoriaceous, elliptic to oblong-elliptic, occasionally ovate-elliptic, obtusely caudate-acuminate, the acumen as long as 1 cm., the base cuneate or obtusely cuneate or almost rounded, up to 8.5 (–11.5) cm. long and 3.5 (–4.5) cm. broad, the costa impressed but conspicuous above, the 4 or 5 pairs of lateral nerves inconspicuous above, except the basal pair, all elevated beneath. The lower pair or pairs of lateral nerves usually diverge from the costa at an angle of about 35° , whereas the upper less conspicuous pairs diverge at an angle of 45° or more. The appearance simulates a sub-triplinerved condition. The reticulation is loose and obscure above but more closely knit and prominent beneath. The glabrescent few-flowered inflorescence consists of an axillary panicle up to 4 cm. long, subtended by a slender glabrescent peduncle up to 2 cm. in length. The white flowers are pubescent and up to 3 mm. long, the diameter 8.5 mm., the filamentous pedicel 2–3 mm. long. The elliptic thick lobes are about 3 mm. long and papillose within. The two outer series of stamens are ± 0.8 mm. long, consisting of subreniform often emarginate anthers borne on thick very short filaments. Those of the third series are ± 1 mm. long, with squarish anthers slightly longer than the filaments, which bear two roundish short-stipitate glands at their bases. The staminodia are usually stipe-like, ± 0.6 mm. long. The glabrous gynaecium measures ± 1 mm. long, the depressed-globose short-stipitate ovary nearly twice the length of the style, which bears at its apex a peltate conspicuous stigma. The immature (?) fruit is subglobose, apiculate, borne in a cyathiform coral-orange, according to the collector, cupule, up to 4 mm. long, to 8 mm. in diameter, and 3–4 mm. deep, undulate or often bearing the persistent remains of the enlarged lobes of the perianth. The pedicel measures up to 8 mm. long and has expanded to 3 mm. in diameter at the apex.

Although the flowers of the type possess staminodia that are conspicuous, a character of the genus *Phoebe*, the shape of the anthers and the gynaecium as a whole place the species under *Nectandra*.

16. *Nectandra longicaudata* (Lundell), comb. nov.

Phoebe longicaudata Lundell in Bull. Torrey Bot. Club 64: 548. 1937.

DISTRIBUTION: British Honduras, Guatemala, and eastern Mexico, usually in advanced forests.

MEXICO: Chiapas: Javalinero, Palenque, *Matuda* 3643 (fl., A, Ch, NY). GUATEMALA: Izabal: Bay of Santo Tomás, between Escobas and Santo Tomás, *Steyermark* 39231 (fr., Ch). BRITISH HONDURAS: El Cayo: On hillside, Vaca, *Gentle* 2474 (fr., A, NY); in advanced forest, on limestone hill, Valentín, *Lundell* 6401 (fr., GH, NY); in riparian and marginal forest near San Augustin, Mountain Pine Ridge, August, 1936, *Lundell* 6757 (fr., SYNTYPE not seen), 6833 (fl., SYNTYPE not seen). Stann Creek: All Pines, in broken forest-clumps, *Schipp* 571 (fr., Ch, GH, NY). Toledo: Near Jenkins Creek in hammock in pine-ridge, north of Monkey River, *Gentle* 4094 (fl., A).

NATIVE NAME: "Aguacatillo" (British Honduras).

I have seen no type-material of this species, but *Lundell* 6401, cited by Lundell, doubtless represents the species described. The branchlets are

early pubescent (rufous-pilose), becoming glabrescent to glabrous with age, and slightly sulcate. The leaf-blades, with flat petioles up to 1 cm. long, are coriaceous, elliptic, up to 14 cm. long and 4.5 (-6.2) cm. broad, with often oblique cuneate bases and acuminate to caudate-acuminate apices. The costa and 4 or 5 pairs of lateral nerves are impressed above and elevated beneath, the lateral nerves bearing pubescent glands in their axils and diverging from the costa at an angle of 35-45°. The blades are everywhere reticulate. The few-flowered inflorescences are not longer than 4.5 cm. and are pubescent, becoming glabrescent. The flowers are about 4 mm. long, borne on slender pubescent pedicels up to 3 mm. The elliptic perianth-lobes are \pm 3.5 mm. long and are spreading and often reflexed. The stamens of the two outer series are \pm 0.8 mm. long, the anthers sessile and subreniform. Those of the inner series are rectangular, slightly longer than the filaments, which are sparsely pubescent at the base and bear conspicuous sessile glands the length of the filaments. The staminodia are cordate, up to 0.7 mm. long, the slender pubescent stipes more than half the entire length. The glabrous gynoecium is \pm 1.5 mm. long, the subglobose ovary slightly stipitate, with a short style topped by a discoid stigma. The ellipsoid or subglobose apiculate black fruit, 12 \times 9-10 mm., is seated on a shallow cyathiform cupule not more than 2 mm. long and 6 mm. broad at the apex, and about 1 mm. deep. The subtending pedicel is enlarged to about 7 mm. in length and 2.5 mm. in width at the apex.

The nearest relatives of the species may be found, generally speaking, in the *N. salicifolia* complex. Specifically *N. longicaudata* resembles *N. savannarum*, from the same general area, from which it is readily distinguished by the persistent ferruginous pubescence of the young branchlets and the rather decided tendency toward a subtriplinerviate condition. The leaves of *N. savannarum* are on the whole smaller, not more than 11.5 cm. long at most. Schipp 571 has leaves that are more heavily coriaceous, varnished-shining above, and more heavily and more conspicuously reticulate. The fruit is oblong-elliptic, consistently 16 \times 8 mm., the infructescence as a whole being more robust than that of the other specimens.

Gentle 1572, cited by Lundell under *Phoebe longicaudata*, seems to belong with *N. savannarum*.

17. *Nectandra nervosa* Mez & Pittier ex Mez in Bull. Herb. Boiss. II. 3: 235. 1903; Standley in Field Mus. Publ. Bot. 18: 453. 1937.

DISTRIBUTION: Costa Rica, known only from the type-locality.

COSTA RICA: Puntarenas: Terraba, at the mouth of the river on the banks, Tonduz (Herb. Inst. Costa Rica) 6758 (fr., TYPE not seen).

Slender glabrous branchlets and shortly pilose buds characterize this species, known only from the type. The glabrous leaves are borne on slender canaliculate petioles up to 8 mm. long. The blades are broadly lanceolate or elliptic-lanceolate, acute at the base, very acuminate at the apex, chartaceous, 13 cm. long and 3.5 cm. broad, above in the dried state glaucous, below reddish green, everywhere densely and very prominently reticulate. The inflorescence is unknown, but the infructescence is longer than the leaves (three or more times) and is glabrous, with the fruit-bearing pedicel enlarged up to 10 mm. in length. The ellipsoid fruit is 10 mm. long and 6 mm. in diameter, subtended by a semi-globose acutely simple-margined cupule which in the dried state is verruculose.

The affinity of the species is noted under *N. salicina*.

18. *Nectandra salicina*, sp. nov.

Arbor 5–8 m. alta, ramis dense foliosis, griseis, sulcatis, glabris, ramulis brunneis mox griseis, striatis, angulatis. Folia alternata vel saepe subopposita, petiolis alatis gracilibus glabris canaliculatis, 5–10 mm. longis et 1 mm. latis, laminis utrinque glabris, supra lucidis subtus minus, coriaceis, in sicco viridibus vel interdum brunneis, subtus saepe leviter pallidis, lanceolatis, ad 10 (–11) cm. longis et 2–2.5 (–3.4) cm. latis, basi attenuato-cuneatis, apice acutis vel attenuato-acuminatis saepe attenuato-obtuso-acuminatis, penninerviis, costa supra obscura subtus conspicue elevata, nervis 6 vel 7-paribus utrinque obscuris angulo 25–35° divergentibus, rete venularum nunc utrinque conspicuo nunc supra inconspicuo. Inflorescentia axillaris, paniculata, 8–9 (–12) cm. longa, glabra, pauciflora, gracilis, longipedunculata, pedunculo 6–8 cm. longo, glabro. Flores ad 3 mm. longi, pedicellis ad 5 mm. longis, tenuibus, perianthio vadose subcampanulato, cano, lobis oblongis recurvatis crassis intus et apice extus dense papillostomentosis, ad 3 mm. longis; staminibus ser. I & II \pm 0.9 mm. longis et latis, antheris reniformibus plerumque filamento duplo longioribus, ser. III \pm 1.25 mm. longis, conspicue biglandulosis, glandulis et filamentis antheris subaequalibus; staminodii conspicui triangularibus stipitatis \pm 0.6 mm. longis; gynaeocio glabro \pm 1.5 mm. longo, ovario subgloboso stylo duplo longiore, stigmate plerumque triangulari conspicuo. Fructus viridis, fide coll., subglobosus, apiculatus, 20 \times 18 mm., cupula rubra minute verruculosa, fide coll., glabra, ad 6 mm. longa, 10–12 mm. lata, et 2–3 mm. alta, margine undulata, subtentus, pedicello incrassato glabro, in sicco aciculato, ad 1 cm. longo.

DISTRIBUTION: In Alajuela Province of Costa Rica at 850–1000 m. altitude, in Guanacaste Province at an altitude of 500–600 m., and in the cloud-forest of Cerro Horqueta, Boquete District, Chiriquí, Panama, at 1980 m. altitude.

COSTA RICA: Guanacaste: Vicinity of Tilarán in moist forest, *Standley & Valerio* 44506 (fl., Ch). Alajuela: Near San Ramón, *Brenes* 371 (515) (fl., Ch); hedges, along road between San Miguel and La Palma de San Ramón, alt. 900–950 m., Feb. 7, 1925, *Brenes* 4206 (218) (fl., TYPE, Ch) (tree 5–7 m. with conical-globose crown; flowers small, white, in terminal clusters of 2 to 3-flowered cymes); woods, Piedades of San Ramón, alt. 1000 m., June 21, 1925, *Brenes* 4272 (57) (fr., Ch) (small tree 5–6 m., fruits green, pendent; cupule vivid red, same length as the peduncle, round or nearly so, small); hedges, woods, San Miguel de San Ramón, *Brenes* 5393 (537) (fl., Ch); Piedades Sur (Quebrada Honda), about La Palma de San Ramón, *Brenes* 5846 (fr., Ch); between "Pata de Gallo" and Santiago de San Ramón, *Brenes* 6650 (fl., Ch); Camino at Calera and Calera de San Ramón, *Brenes* 18942 (fl., Ch); [hills of San Pedro de San Ramón, *Brenes* 20332 (fl., Ch)]; Barranca of San Ramón, *A. Smith* P.2351 (fl., A). PANAMA: Chiriquí: Cerro Horqueta, Boquete, *C. & V. W. von Hagen* 2118 (fr., fragm., A, Mo).

NATIVE NAMES: "Aguacatillo" (Costa Rica); "Sigua blanca" (Panama).

This species seems to be near *N. nervosa* Mez & Pittier. The latter, however, has broadly lanceolate or elliptic-lanceolate leaves up to 13 cm. long, glaucous above and reddish green beneath. The inflorescence is squarrosely tripinnately paniculate. The fruit is ellipsoid, 10 \times 6 mm., with a semi-globose acutely simple-margined cupule, verruculose in the dried state. These characters separate the two entities at once.

19. *Nectandra coriacea* (Swartz) Grisebach, Fl. Brit. W. Ind. 281. 1860; Mez in Jahrb. Bot. Gart. Berlin 5: 459. 1889; Allen in Addisonia 22: 9, pl. 709. 1943.
Laurus coriacea Swartz, Prodr. 65. 1788; Fl. Ind. Occ. 710. 1800.
Nectandra Willdenoviana Nees, Syst. 321. 1836; Meissner in DC. Prodr. 15¹: 165. 1864.
Ocotea Lundellii Standley in Carnegie Inst. Washington Publ. 461: 56. 1935; Standley & Record in Field Mus. Publ. Bot. 12: 143. 1936.

DISTRIBUTION: Florida, West Indies, Yucatan peninsula, British Honduras, and Guatemala.

[JAMAICA: Without locality or collector, (TYPE of *Laurus coriacea* not seen).] MEXICO: Yucatán: without locality, *Gaumer* 23980 (fl., Ch, GH, NY), 24248 (fl., Ch, GH), 24274 (fl., GH, NY), 24290 (fl., Ch), 24337 (fl., Ch); Cozumel, *Gaumer* 85 (fl., Ch); Chichen Itza, off Kaua road in advanced deciduous forest, *C. L. & A. A. Lundell* 7435 (fl., A); Lake Chichankanab, *Gaumer & Sons* 23655 (fl., Ch), 23668 (fl., Ch, GH). Campeche: Hacienda San Pablo, near Champoton, Morelos, *Collins* 47a (fl., NY); Tuxpeña, *Lundell* s.n. (fl., Ch), 1071 (fr., Ch), 1367 (fl., NY). GUATEMALA: Petén: Lake Petén, *Lundell* 3195 (fl., Ch), Ixlu ruins, Lake Petén, June 15, 1933, *Lundell* 4359 (fl. type of *Ocotea Lundellii*, Ch); Uaxactún, *Barilett* 12335 (fl., A, Ch, NY), 12547 (fl., A, Ch, NY). Alta Verapaz: Woods southeast of Finca Yalpemech, near Alta Verapaz-Petén boundary line, *Steyermark* 45216 (sterile, Ch). Izabal: Río Dulce, between Livingston and 6 miles up river on north side (right hand side going up river), *Steyermark* 39402 (fl., Ch). BRITISH HONDURAS: Orange Walk: Coastal region at Honey Camp, *Lundell* 423 (fr., Ch, NY); Belize: Maskall, *Gentile* 1206 (fl., A, Ch, GH, NY), 1216 (fl., A, Ch, GH, NY). Toledo: Jacinto Hills, in shaded valley, *Schipp* 1206 (fl., Ch, GH, NY).

NATIVE NAMES: "Laurel" (Campeche); "Sweetwood" (Jamaica, British Honduras).

This species, as it occurs in our area, has branchlets that vary from brownish and striate to a striking silver-gray. The alternate leaves are borne on petioles that are usually 1 cm. or less in length (7–14 mm.), canaliculate, and glabrous. The blades are coriaceous, glabrous, lanceolate-elliptic or lanceolate-oblong, the base cuneate, the apex obtusely acute or obtusely acuminate, the acumen varying in length from very short and abrupt to nearly 1 cm. The blades measure up to 12 cm. long and 6 cm. broad (usually 7–9 × 3.5–4 cm.). The venation of this species is the most outstanding feature. The costa is prominent, though slightly submersed above, and very prominently elevated beneath. The 6–8 pairs of lateral nerves diverge from the costa at an angle of 45° and are slightly arcuate. The lateral nerves, however, are usually obscured by the very conspicuous over-all rather loose elevated reticulation of the blades. This reticulation usually draws the attention before the lateral nerves are noted. The inflorescence varies from few to many axillary or subterminal panicles not more than 6 (–8) cm. long, either sparsely or densely flowered. The white flowers are 5–8 mm. in diameter, the elliptic lobes heavily papillose, ± 3.6 mm. in length. The two outer series of stamens consist of nearly sessile anthers which are reniform and slightly emarginate, measuring ± 0.6 mm. in length. The stamens of the inner series are longer, ± 0.8–1 mm. long, the squarish anthers borne on filaments almost their equal in length, which bear two large subreniform sessile glands nearly the width of the anthers. The staminodia are triquetrous, ± 0.8 mm. long, borne on slender pubescent filaments that are nearly two-thirds the length of the entire structure. The gynoecium is glabrous, ± 1.7 mm. long. The subglobose or subovoid ovary is about twice the length of the stout style, which is topped by a conspicuous capitate stigma. The fruit is black, ovoid or subglobose, apiculate,

1 (-1.5) cm. long and 6 mm. wide, at maturity supposedly nearly the same width. The fruit is subtended by a shallow cyathiform cupule 3-4 mm. long and 6-7 mm. in diameter at the undulating apex, and 2.5 mm. deep. The supporting pedicel is up to 8 mm. long, expanding to 2 mm. in diameter at the apex.

The nearest affinity of the species is the entity which heretofore has passed as *Nectandra sanguinea* Rottb. The difference in the fruiting cupule, the venation, and coriaceous texture of the leaves set the species apart. Standley notes that *Ocotea Lundellii* is most nearly related to *Ocotea Catesbyana* Sargent from southern Florida. The latter was based on *Laurus Catesbyana* Michaux, which was once included erroneously under *N. coriacea*. Although the superficial resemblance is striking, the structure of the flowers, particularly the reniform anthers, immediately places the species in *Nectandra*.

20. *Nectandra salicifolia* (H.B.K.) Nees, Syst. Laurin. 302. 1836, in Linnaea 21: 506. 1848.

Ocotea salicifolia H.B.K., Nov. Gen & Sp. 2: 132 [166]. 1817; Hooker & Arnott, Bot. Voy. Beechey 309. 1841.

Ocotea globosa sensu Schlechtendal & Chamisso in Linnaea 6: 366. 1831.

Nectandra sanguinea sensu Nees, Syst. Laurin. 318. 1836, quoad spec. Mex., non Rolander ex Rottboell; Meissner in DC. Prodr. 15¹: 164. 1864, quoad spec. Mex.; Hemsley, Biol. Centr. Am. Bot. 3: 75. 1882; Mez in Jahrb. Bot. Gart. Berlin 5: 457. 1889, quoad spec. Mex. & C. Am.

Nectandra glabrescens Benthon, Bot. Voy. Sulphur 161. 1846; Walpers, Ann. 1: 575. 1849; Meissner in DC. Prodr. 15¹: 165. 1864; Hemsley, Biol. Centr. Am. Bot. 3: 74. 1882; Mez in Jahrb. Bot. Gart. Berlin 5: 425. 1889, excl. spec. S. Am. & W. Ind.; Standley in Contr. U. S. Nat. Herb. 23: 297. 1922; Standley & Calderón, Lista Prelim. Pl. Salvador 84. 1925; Record in Trop. Woods 10: 21. 1927; Standley in Field Mus. Publ. Bot. 10: 200. 1931; Standley & Record in Field Mus. Publ. Bot. 12: 142. 1936; Yuncker & Record in Field Mus. Publ. Bot. 17: 363. 1938.

Nectandra sanguinea var. *angustifolia* Schlechtendal in Linnaea 19: 257. 1847.

Nectandra sanguinea var. β *lanceolata* Meissner in DC. Prodr. 15¹: 164. 1864; Hemsley, Biol. Centr. Am. Bot. 3: 75. 1882.

DISTRIBUTION: Mexico and Central America, at varying altitudes and in diverse habitats.

MEXICO: Without locality, *Galeotti* B.8 (fl., Ch), [718] (fl., Ch); *Haenke* [1540] (fr., NY); *Leibold* 108 (fl. type of *N. sanguinea* var. *angustifolia* not seen). San Luis Potosí: El Banito, 7 mi. south of Valles, *Leavenworth* 189 (fl., Ch, GH); semi-desert road-side south of Valles, *Leavenworth* 223 (fl., Ch, GH, NY); Tamasopo Cañon, *Pringle* 3541, 3725 (fl., GH, NY); Tamazunchale, *Edwards* 602 (young fr., Ch). Vera Cruz: Hacienda de la Laguna, *Schiede* 57 (fr., Mo); Papantla, *Schiede* & *Deppe* 1144 (fl., cited by Schlechtendal and Chamisso as *O. globosa*, Mo); road from Papantla to Zamora, *Goldman* 88 (fl., GH); Colipa, *Liebmamn* s.n. (fl., GH, NY); Jalapa, [Schiede?] (fr., GH); Mirador, *Liebmamn* s.n. (fr., GH); Zacuapán, *Purpus* 2023 (fr., Ch, GH), 14151, 14327 (fl., Ch); Barranca de Panoya, *Purpus* 8425, 8503 (fl., GH); Remulatero, *Purpus* 8741 (fl., GH, NY); Remudadero, *Purpus* 8955 (fl., GH, NY), 10965 (fl., Ch); banks of Río de los Pescados, near Puente Nacional, *Purpus* 11166 (fl., Ch); Orizaba, *Botteri* 34, 302 (fl., GH), 986 (fl., NY), 1081, 1193 (fl., GH), *Millspaugh* Herb. s.n. (fl., Ch), *Purpus* 1324 (fl., GH, NY); Cordoba, *Bourgeau* 1961 (fl., Ch, GH, NY), *Orcutt* 3344 (fl., Ch); Cuitláhuac, *Matuda* 1417 (fl., A). Mexico: Temascaltepec, Salitre-Canitas, wet barranca, *Hinton* 3816 (fl., A, NY). Guerrero: La Aguilá, *Langlassé* 250 (fl., GH); Acapulco, *Humboldt* & *Bonpland* s.n. (fr. ?, TYPE of *Ocotea salicifolia* not seen), *E. Palmer* 164 (fr., GH), 582 (fl., GH, NY). Oaxaca:

Tuxtepec, Chiltepec and vicinity, in llanos, *Martínez-Calderón* 376 (fl., A); Piedras Negras, Pochutla, *Conzatti*, *Reko* & *Makrinitius* 3203 (fl., GH); Yaveo, trail west to Río Yaveo; Choapam, understorey in open forest, *Mexia* 9175 (fl., Ch, GH, NY); Tepenixtlahuaca á Río Verde, *Conzatti* 4385 (fr., NY). Tabasco: Mercedes, Balancan, *Matuda* 3027 (fl., A, Ch); Tenosique, *Matuda* 3402 (fl., A, Ch, NY). Chiapas: Santa Rosa, near Escuintla, in advanced forest, *Matuda* 4264 (fl., A, NY); Malpaso, near Siltepec, in advanced forest, *Matuda* 4522 (fl., A). GUATEMALA: Petén: El Paso, *Lundell* 1528 (fl., NY); Uaxactún, near aguada, *Bartlett* 12355 (fl., Ch); Santa Cruz, 12371 (fl., Ch), 12724 (fl., Ch); La Libertad and vicinity, *Aguilar* 91 (fl., A), 280, 387 (fl., NY), *Lundell* 2113, 2176 (fl., Ch); along Río Santa Izabal, between mouth of Río Sebol and El Porvenir, *Steyermark* 45847 (fl., Ch); along Río Cancuen, between El Cambio and mouth of Río Machaquila, *Steyermark* 45921 (fl., Ch). Alta Verapaz: Between Sachaj and Sacacac, *Steyermark* 45130 (fl., Ch); along Río Semococh, between Semococh and Chajamayic, *Steyermark* 45731 (fl., Ch); along Río Sebol, between Sebol and Carrizal, north of Sebol, *Steyermark* 45757 (fl., Ch); Cubil-güitz, von *Tuerckheim* 8577 (fl., GH, NY). Baja Verapaz: Sierra de las Minas, San Augustine, *Kellerman* 7628 (fr., Ch). Izabal: Río Dulce, between Livingston and 6 miles up river, on north side (right hand side going up river), *Steyermark* 39397 (fl., Ch); bank of Río Dulce, *C. L. Wilson* 406 (fl., Ch). Quezaltenango: Colomba, *Skutch* s.n. (fl., Ch), 1286 (fl., A, NY), 1363 (fl., A, Ch). HONDURAS: Without locality, forest along Highland Creek, Puerto Sierra, *P. Wilson* 145 (fl., NY). Comayagua: Thicket above the plains of Siguatepeque, *Yuncker*, *Dawson* & *Youse* 6144 (fl., Ch, GH, NY). Yoro: In open forest on margin of small stream on mountain-slopes near the village of Los Flores, in the Aguan River valley, near Coyoles, *Yuncker*, *Koepper* & *Wagner* 8161 (fl., Ch, GH, NY), 8162 (fl., Ch). Atlántida: On the mountain-slopes and coastal plains, in forest, foothills near the Cangrejal River, in the vicinity of La Ceiba, *Yuncker*, *Koepper* & *Wagner* 8680 (fr., Ch, GH, NY). BRITISH HONDURAS: Without locality, *Castillo* 16 (fl., Ch, Y), *Gentle* 174 (fl., Ch), Northern River, *Gentle* 1035 (fl., NY). Corozal: High ridge, San Joaquin, *Gentle* 8 (fr., Ch), 4748 (fr., Ch, GH, NY). Orange Walk: Roaring Creek, *Lundell* 448 (fl., Ch); Honey Camp, *Meyer* 54 (fr., Ch). El Cayo: Bank of Belize River, *Gentle* 2232 (fl., A, NY). Belize: Little Cocquericot, Belize River, *Lundell* 4361 (fr., Ch), 4362 (fl., Ch, NY), 4363 (fr., Ch); Maskall Pine Ridge, *Gentle* 1055 (fl., GH, NY), 1275 (fr., Ch, NY); Sibun River, *Gentle* 1410 (fr., Ch, NY), 1511 (fl., NY), Gracie Rock, 1524 (fl., NY). Stann Creek: Forest Guard, Freshwater Creek, *Kelly* 2 (fl., Ch, GH, NY); Moho River, in wet forest, *Peck* 737 (fl., GH). COSTA RICA: San José: Vicinity of El General, *Skutch* 4172 (fl., A, NY), 4328 (fl., A, Ch, NY), 4905 (fl., A, Ch, NY).

NATIVE NAMES: "Aguacate" (Vera Cruz); "Aguacatillo" (Michoacán); "Laurel" (Vera Cruz, Yucatán, British Honduras); "Piesito de Paloma" (Mexico); "Timbersweet" (British Honduras).

This is one of the most variable of the *Nectandreae*, which has been known heretofore as *N. sanguinea* Rottb., and is of all species in our area the most widely collected. Originally the species *Nectandra sanguinea* was described from Surinam. Nees extended the range to Martinique, other islands of the West Indies, and Mexico, describing a variety from St. Vincent. He included *Laurus globosa* Aublet from Guiana in the synonymy. Meissner followed Nees, adding another variety from Mexico which included in part *Schiede* 57 and in toto *Ocotea salicifolia* H.B.K. Mez segregated *Laurus globosa* Aublet, under the binomial *Nectandra globosa*. According to Kostermans (Meded. Bot. Mus. Utrecht 25: 20. 1936), Mez did not see the type of *N. sanguinea*, based on Rolander's specimen. Kostermans intimates that the latter name belongs to *N. Pisi* from Surinam, and that *N. sanguinea*

as interpreted by Mez (presumably the Mexican, Central American, and West Indian material) does not occur in Surinam. A complete understanding of the synonymy involved must perforce await examination of the types of the species in question, when they are once more available for study. Insofar as may be ascertained from the specimens at hand, the correct epithet for the Mexican and Central American material appears to be *N. salicifolia* (H.B.K.) Nees. There can be no question of Mez' segregation of *Laurus globosa* Aublet as *Nectandra globosa*, for the shape of the anthers of the latter places it in a different category entirely from *N. salicifolia*.

Nectandra salicifolia, then, may be described as a tree or shrub with branchlets that are angled, becoming terete, striate, brownish and becoming grayish, or sometimes reddish and becoming brown. They are early whitish-pubescent, later becoming glabrous and often shining. The leaves vary considerably, with the petioles up to 1 cm. long, canaliculate, glabrous or glabrescent. The blades are chartaceous to coriaceous, lanceolate, lanceolate-elliptic, or elliptic, cuneate at the base and either acute or obtusely acute or obtusely acuminate at the apex. They measure (4-) 5.5-16 (-20) cm. long and (2-) 3-5 (-9) cm. broad and are glabrous except for pubescent glands in the axils of the lateral nerves on the lower leaf-surface, which are sometimes very conspicuous or often entirely lacking. The costa is impressed above, very prominent beneath; the 5-9 pairs of lateral nerves are slightly elevated beneath and diverge at an angle of 35-45° from the costa. The reticulation of the blade is usually very conspicuous throughout. The subterminal or axillary inflorescences are shorter or occasionally longer than the leaves and are up to 10 cm. long. They may be comparatively few-flowered single panicles or, as is usually the case, many-flowered broad and branching subcorymbose panicles. In the early stages they are whitish-pubescent but shortly become glabrescent or glabrous. The flower is usually between 3 and 4 mm. long (occasionally 5 mm.), with scarcely any noticeable tube, and is supported by a slender pubescent pedicel 3-4 mm. long. At anthesis the perianth-lobes are spreading (the flower being sometimes to 1 cm. in diameter) and reflexed. The lobes are lanceolate-elliptic, occasionally elliptic, usually obtuse, up to 3 (sometimes 5) mm. long, fleshy, pubescent on the outer surface and papillose within. The stamens of the two outer series are ± 0.6 (rarely ± 0.8) mm. long and nearly half again as broad. The anthers are reniform, frequently emarginate, sessile or with very short filaments. The stamens of the third series are longer, with the anthers almost square and emarginate at the tip. The two upper cells are lateral, whereas the two lower are extrorse. The filaments bear at their base two large conspicuous glands almost as long as the anthers. The slender small triangular or triquetrous staminodia are usually ± 0.6 mm. long, borne on stipes nearly $\frac{2}{3}$ their entire length and almost the same width as the staminodia. The glabrous gynoecium is $+1.25$ (sometimes ± 1.9) mm. long. The subglobose ovary is usually three times the length of the short style, which is topped by a flat inconspicuous stigma. The fruit is subglobose to (immature?) ellipsoid, minutely apiculate, to 11 mm. long and 8 mm. in diameter, glabrous, black, subtended by an almost disk-like shallow woody cupule about 1 mm. long and 5 mm. in diameter, glabrous and only slightly undulate. The cupule is supported by the enlarged

pedicel about 5 mm. long, expanded to 3 mm. in breadth at the apex.

Most specimens collected are in the flowering stage and show variations which are definitely within the limits of the species. Occasionally specimens are found in which no staminodia are seen, but this is not usual. The length of the short filament supporting the anther varies considerably. The greatest amount of variation occurs in the specimens from Acapulco, which have larger flowers than the other Mexican specimens.

21. *Nectandra fuscobarbata* (Mez), comb. nov.

Nectandra glabrescens var. *fuscobarbata* Mez in Jahrb. Bot. Gart. Berlin 5: 425. 1889.

Arbor 6-12 m. alta, ramulis brunneis minute sparse pubescentibus mox griseis glabris striatis. Folia alternata, juventute sparse pubescentia mox glabrescentia deinde glabra, petiolis tenuibus, canaliculatis, supra sparse pubescentibus, ad 1 cm. longis et 1 mm. latis, laminis utrinque glabris basi costae subtus excepta, membranaceis, in sicco brunneis vel viridescenti-brunneis, lanceolato-ellipticis, ad 15 cm. longis et ad 5 cm. latis, basi per-attenuato-cuneatis, apice longe caudato-acuminatis, pinninerviis, costa supra leviter subtus conspicue elevata, nervis 4-6 (-8)-paribus utrinque plus minusve obscuris angulo 55° divergentibus, glandulis inconspicuis in nervorum lateralium axillis, rete venularum utrinque leviter prominulo. Inflorescentia axillaris laxe paniculata, ad 15 cm. longa, sparse pubescens, pedunculo brunneo sparse pubescente, ad 5 cm. longo. Flores ad 3 mm. longi, pedicellis pergracilibus pubescentibus, ad 3 mm. longis, perianthio campanulato albo vel pallide viridescente, lobis oblongis reflexis papilloso-pubescentibus, \pm 2.5 mm. longis; staminibus ser. I & II \pm 0.6 mm. longis, antheris subreniformibus longitudine $\frac{2}{3}$ filamentis gracilibus basi pubescentibus aequalibus, ser. III \pm 1 mm. longis conspicue biglandulosis, glandulis stipitatis antheris oblongis et filamentis aequalibus; staminodiis ovatis stipitatis, basi pubescentibus, \pm 0.6 mm. longis; gynaecio glabro, \pm 1.25 mm. longo, ovario ovoideo-globoso longitudine plusquam stylo minusquam gynaecii aequante, stigmate capitato conspicuo. Fructus abnormalis(?) subglobosus, apiculatus, conspicue griseo-sericeus, minute papilloso, \pm 7 mm. diam., cupula vadosa glabra minute verruculosa sub-campanulata 3 mm. longa et 5 mm. diam. subtentus, pedicello ad 5 mm. longo apice ad 3 mm. diam. expanso.

DISTRIBUTION: Known only from Panama.

PANAMA: Without locality, Hayes 487 (TYPE of *N. glabrescens* var. *fuscobarbata* not seen). Bocas del Toro: Fish Creek Hills, vicinity of Chiriquí Lagoon, von Wedel 2431 (fl., A); Isla Colon, von Wedel 2866 (fl., A), 2969 (fl., A); Flat Rock, region of Almirante, G. P. Cooper 551 (fr., Ch, GH, NY).

NATIVE NAME: "Rock Sweetwood" (Panama).

This entity, seemingly a segregate of *N. salicifolia*, because of the single character of fuscous barbate hairs in the axils of the leaves, has flower-structure similar to that of the latter species. Examination of a large amount of material from Mexico and Central America of the species proper shows many numbers with pubescent glands in the axils of their lower leaf-surfaces. The bases of the filaments as well as the stipes of the staminodia are pubescent. The ovary is glabrous, but the fruit is pubescent. I am inclined from the general aspect of the fruiting material from Bocas del Toro to believe that these are not normal fruits.

22. *Nectandra nitida* Mez in Jahrb. Bot. Gart. Berlin 5: 461. 1889; Standley in U. S. Nat. Herb. 23: 297. 1922.

DISTRIBUTION: Mexico and Panama.

MEXICO: Without locality, western part, *Haenke s.n.* (SYNTYPE not seen).

PANAMA: Canal Zone: Near Barbacans station, *Hayes 133* (SYNTYPE not seen).

This species seems to stand out for its golden—"glittering"—tomentose young branchlets, eventually becoming cinereous, glabrous, and terete, and its golden-lanuginose buds. The petioles are not more than 6 mm. in length, are canaliculate, subtending chartaceous leaf-blades that in young stages are sericeous-lanuginose, golden, and glittering. See *N. latifolia* for discussion.

23. *Nectandra perdubia* Lundell in Lloydia 4: 47. 1941.

DISTRIBUTION: Mexico and Central America, for the most part at fairly low altitudes. Frequently to be found along stream-banks.

MEXICO: Michoacán: Coalcomán, *Hinton 13667* (fr., GH), *13668* (fl., GH), *13856* (fl., GH), *13918* (fl., GH). Oaxaca: Vicinity of San Juan Guichicovi, *Nelson 2725* (fl., fr., Ch); Ubero, *L. Williams 9492* (fl., A, Ch, NY). Tabasco: Boca Cerro, Tenosique, July 1-5, 1939, *Matuda 3576* (fl., ISOTYPE, A, Ch, NY). GUATEMALA: Petén: Uaxactún, *Bartlett 12708* (fl., Ch); Santa Teresa, Subin River, *Lundell 2735* (fr., Ch); La Libertad, *Lundell 3348* (fr., Ch), *3716* (fl., Ch). Alta Verapaz: Vicinity of Secanquim, *Pittier 178* (fl., Ch); vicinity of caves, southwest of Lanquín, *Steyermark 44073* (fr., Ch); along route no. 5 between Chirriacté and Semococh, *Steyermark 46352* (fl., Ch). Izabal: Río Dulce, 2-4 miles west of Livingston, on south side (left hand side going up river), *Steyermark 39538* (fl., Ch). HONDURAS: Copán: Along trail from El Paraíso to La Florida, *Pittier 8468* (fl., NY). BRITISH HONDURAS: Without locality, hill-bank, *Record B.H.30* (Y 8798) (fr., Y). El Cayo: El Cayo and vicinity, *Chanek 58, 61* (fl., Ch). Belize: Gracie Rock, Sibun River, *Gentle 1692* (fl., A, NY). Stann Creek: In valley, Big Eddy Ridge, *Gentle 3543* (fl., A, NY). COSTA RICA: Puntarenas: Puerto Jiminez de Osa (Golfo Dulce), *Brenes 12163* (642) (fl., Ch); woods on sea-shore, Golfito de Osa, *Brenes 12314* (793) (fl., Ch). San José: Near San José, edge of Río Virilla at Uruca, *Tonduz 7271* (Herb. Nat. Costa Rica 10104) (fl., GH, NY). Cartago: Río Turrialba, *J. D. Smith 4932* (fl., GH).

NATIVE NAMES: "Aguacatillo" (Mexico); "Bastard Timbersweet," "Laurel" (British Honduras).

A species near *N. nitida*, according to the author, but distinguished from it by the narrower leaves which are less reticulate and more smooth and shining on the upper surface. The younger branchlets and inflorescences retain their pubescence longer than do those of *N. nitida*. The latter, as well as *N. perdubia*, has the same basic floral structure as is found in *N. salicifolia*.

The species has striate branchlets which are clothed with a minute close brownish-ferruginous tomentum which rubs off early, leaving them dark gray or occasionally darker brown. The leaves are borne on stout tomentose scarcely canaliculate petioles up to 1 cm. long. The lanceolate to elliptic, acuminate to subcaudate, leaf-blades are cuneate at the base and measure up to 17 cm. long and 6 cm. broad. The upper surface is early pubescent, but shining at maturity, the 7-9 lateral nerves diverging at an angle of about 35°, and the costa impressed and not prominent. The lower surface is everywhere minutely pubescent at maturity, with scattered floccose pubescence in addition, particularly about the region of the veins, which

bear more or less pubescent inconspicuous axillary glands beneath. The lateral nerves and costa are prominently elevated beneath and pubescent. The lower surface is definitely but loosely reticulate. The inflorescences are axillary and subterminal many-flowered panicles, densely covered with a minute ferruginous tomentum which becomes less with age. They are subtended by sericeous foliose bracts which presently are deciduous. The flowers are 5.5–7.5 mm. in diameter, the tube short, the elliptic perianth-lobes rather thin or sometimes thickish, fleshy and papillose, up to 3.5 mm. long, tomentose without. The stamens of the two outer series are \pm 0.8 mm. long, the subreniform anthers once and a half or twice the length of the stout filaments, which are sometimes pubescent. Those of the inner series are \pm 1.25 mm. long and have anthers which are almost square, emarginate, the two upper cells lateral, the lower extrorse. The filaments nearly equal the anthers in length and bear at the base two large subreniform sessile glands nearly the length of the anthers. The staminodia are \pm 0.6 mm. long, variable, often triquetrous, the usually somewhat slender stipe nearly half the entire length. The glabrous gynoecium measures \pm 1.25 mm., the subglobose ovary constricted at the base and about three times the length of the slender style which bears at its apex a usually conspicuous subcapitate stigma. The fruit (immature?) appears to be small (6.5–10 mm. long and 5.5–8 mm. broad), subglobose, apiculate, subtended by a shallow cyathiform cupule 1.5–3 mm. long, up to 7 mm. in diameter, and less than 2 mm. deep. The slightly enlarged pedicel is up to 5 mm. long and expanded to 3 mm. at the apex.

24. *Nectandra latifolia* (H.B.K.) Mez in Jahrb. Bot. Gart. Berlin 5: 454. 1889.

Ocotea latifolia H.B.K. Nov. Gen. & Sp. 2: 133 [169]. 1817.

DISTRIBUTION: Central America from Nicaragua through Panama, south through Colombia to Brazil, according to Mez.

PANAMA: Canal Zone: Without locality, Christopherson 132 (fl., NY); hills near Gatun Station, Panama R.R., Feb. 7, 1860, Hayes s.n. (fl., GH, US), 59 (fr., GH); Gatun Lake at turning point from canal, Bangham 425 (fr., Ch); Chagres, Fendler 54 (fl., Ch, GH, Mo, US); Barro Colorado Island, Aviles 113 (fr., Ch), 950 (fl., Ch), L. H. & E. Z. Bailey 92 (fl., Ch), 307 (fr., Ch); Woodworth & Vestal 692 (fl., A, Ch). [COLOMBIA: Cundinamarca: High plains of Bogotá, Humboldt & Bonpland (fr., TYPE not seen).]

This species is very distinct because of its foliage characters. The leaves have petioles 6–12 mm. long, pubescent to glabrous, and canaliculate. The blades, becoming glabrous except for inconspicuous axillary glands, are chartaceous to subcoriaceous, very shining above, dull beneath, elliptic, the base cuneate to roundish, the apex caudate-acuminate, and they measure about 12 (–15) cm. long and 3.5 (–6) cm. broad. The costa and lateral nerves (4–6 pairs) are somewhat obscure above, elevated beneath, and diverge from the costa at an angle of 35–50 (–55)°. The minute reticulation likewise is exceedingly prominent above and beneath. The subcorymbose-paniculate axillary and subterminal branching inflorescences, minutely pubescent, becoming glabrous, measure up to 9 (–13) cm. in length, the peduncle up to 5 cm. long. The flowers measure about 6 mm. in diameter, with thick papillose perianth-lobes, which are elliptic-ovate and \pm 2.15–2.5 (–3.4) mm. long. The stamens of the two outer series are \pm 0.6–0.8 (–1) mm. long, the anthers subreniform, slightly emarginate, twice the length of the rather stout filaments. Those of the inner series are

$\pm .8$ (-1) mm. long, the squarish anthers about equalling the filaments, which bear conspicuous sessile glands nearly the size of the anthers. The staminodia are ovate, ± 0.6 mm. long, the stipes nearly one-half to two-thirds their entire length. The glabrous gynoecium is ± 1.25 mm. long, the subglobose ovary nearly three times the length of the thick short style that is topped by a subcapitate stigma. The subglobose black fruit is about 1 cm. in diameter and is seated on a shallow cupule not more than 2 mm. long, 6 mm. in diameter, and 0.5 mm. deep, the margin slightly and finely undulate. The pedicel is enlarged to 3-4 mm. long and 2.5 mm. in diameter at the apex.

Mez placed *Fendler* 54 under *N. latifolia*, originally described from Colombia, and it seems to agree fairly well with the description. The species *N. nitida*, described from Mexico and the Canal Zone as well, seems to be very close to the so-called *N. latifolia*, differing in leaf-blades that are prominently reticulate above and in the young stage scarcely sericeous beneath, the absence of axillary glands, the branchlets that are sparkling golden-tomentose and the buds that are golden-lanuginose. The flowers also are golden-brown-tomentellous, but their structure is not strikingly different from those of *N. latifolia*. Examination of the types of both species in question is necessary before an accurate disposal may be made of the material at hand.

25. *Nectandra Cufodontisii* (O. C. Schmidt), comb. nov.

Ocotea Cufodontisii O. C. Schmidt in Arch. Bot. Forli 11: 50. 1935.

DISTRIBUTION: Known only from Costa Rica.

COSTA RICA: Alajuela: Alfaro Ruiz, La Brisa de Zarcero, in loam and mold in semi-shade of forest in subtropical zone, *A. Smith H.969* (fl., Ch, NY), *H.972* (fl., A, Ch); Palmira, *A. Smith P.2036* (fl., fr., A). Cartago: On the southwest slope of Volcán Irazú, at the mouth near San Isidro, alt. 2000 m., May 30, 1930, *Cufodontis 315* (fl., fr., ISOTYPE, Ch, photo., Ch, NY) (tree 10 m., with broad crown; flowers greenish).

The young branchlets of this species are angled or almost sulcate, at first subferruginous-sericeous, becoming glabrescent, presently glabrous and grayish. The leaves are borne on canaliculate petioles pubescent and up to 1.5 cm. in length. The blades are elliptic or, according to the author, subovate-lanceolate, acuminate, the base cuneate, chartaceous to subcoriaceous, up to 13 cm. long and 5 cm. broad. The upper surface, according to the author, is somewhat opaque, whereas the lower is almost shining, the entire surface glabrous except for the pubescent axillary glands. The costa and lateral nerves, of which there are 7-9 pairs diverging from the costa at an angle of 35-45°, are very slightly elevated on the upper and more so on the lower surface. The entire surface is conspicuously reticulate. The rather few-flowered axillary or subterminal panicles are minutely subferruginous-pubescent, up to 12 cm. long, and borne on slender pubescent peduncles up to 7 cm. long. The greenish flowers are spreading-campanulate, the heavy fleshy papillose oblong-ovate perianth-lobes measuring up to 3 mm. in length. The stamens of the two outer series are ± 1.5 mm. long, the rounded ovate-globose anthers supported by short stout filaments pubescent at the base and one-quarter the entire length of the stamens. Those of the third series measure ± 1.7 mm. and have anthers that are almost square or subtrapezoid, the filaments almost equalling the anthers and bearing two large conspicuous sessile glands at the base that equal them in length.

The author does not mention the staminodia, which are conspicuous, cordate, ± 0.6 mm. in the type, with the stipes one-half the entire length. Occasionally the staminodia are also biglandular, and occasionally only scale-like. The glabrous gynaecium measures ± 2.15 mm., the subglobose or broadly ovoid ovary more than equaling the stout style, which bears an often conspicuous capitate stigma. The fruit is ovoid-elliptic, up to 2.5 cm. long and about 1.5 cm. broad, borne in a shallow almost disk-like cupule, which is glabrescent, brown, striate (in the dried state), about 2 mm. long, 7 mm. in diameter, and 0.75 mm. deep, the margin undulate. The supporting pedicel is glabrescent, also brown and striate, not more than 4 mm. long and expanded to 2 mm. at the apex.

A fruiting specimen, Standley 47364 from near San José, has young fruits that resemble those of the type, but the leaves do not show the minute reticulation of those of the latter. Schmidt relates the species to *Ocotea insularis*. To my mind, it is more nearly related to *Nectandra latifolia*, differing in the elliptic acuminate rather than oblong-elliptic caudate leaf-blades, the shorter, ovate-oblong rather than strap-shaped perianth-lobes, and the ovoid-ellipsoid instead of globose fruits.

26. *Nectandra tabascensis* Lundell in *Lloydia* 4: 48. 1941.

DISTRIBUTION: Known only from Mexico.

MEXICO: Jalisco: Santa Cruz de Vallarta, wooded ravine on mountain-side, Mexia 1264 (fr., GH, NY). Guerrero: Montes de Oca, by the river, Hinton 10589 (fl., GH), 11473 (fr., GH). Tabasco: La Palma on the San Pedro de Martir River, near the Petén border, Balancan, Matuda 3299 (fl., ISOTYPE, A, GH, NY).

NATIVE NAMES: "Aguacatillo," "Aguacatillo blanco" (Guerrero).

This species is similar in floral structure to *N. salicifolia* and also to *N. Woodsoniana*. The young branchlets, early fulvous-sericeous-tomentellous, later become glabrescent, dark brown, and striate. The petioles are slender, up to 1 cm. long and sericeous, becoming glabrescent. The leaf-blades are chartaceous, lanceolate-elliptic or lanceolate-oblong, cuneate at the base, the apex acute or subacuminate, sparsely grayish-pubescent throughout, more conspicuously so along the midrib, up to 20 cm. long and 5 cm. broad. The costa and lateral nerves, of which there are 11-13 pairs, are slightly elevated on the upper and more prominently so on the lower surface. The reticulation is loose and conspicuous throughout. The inflorescence is axillary, whitish-pubescent, becoming glabrescent, subcorymbose-paniculate or paniculate, up to 11 cm. long, and subtended by a slender sparsely pubescent peduncle up to 6 cm. long. The flowers are whitish-tomentellous, about 3 mm. long and about 6 mm. in diameter at anthesis, subtended by a slender pubescent pedicel up to 3 mm. long. The perianth-tube is conspicuous and the lobes are slightly unequal, rather fleshy, the outer broadly elliptic or ovate and the inner oblong, ± 2.5 mm. long. The stamens of the outer series are roundish-subreniform, sometimes emarginate, ± 0.75 mm. long, the anthers slightly longer than the stout filaments. Those of the inner series are ± 0.8 mm. long, the squarish anthers about equaling the filaments in length. The filaments bear at the base two subglobose sessile glands nearly the length of the anthers. The broadly ovate staminodia measure ± 0.4 mm. and are borne on short stipes that are about one-third the entire length of the staminodia. The glabrous gynaecium is ± 1 mm. long, the subglobose ovary twice the length of the short stout style that is

topped by a rather inconspicuous stigma. The material from Guerrero and Jalisco does not exactly match the type-collection, but the variation appears to be intra-specific. From *Hinton* 11473 and *Gentle* 1264, the fruits seem to be black with a bloom, glabrous, broadly ellipsoid, apiculate, and borne in a shallow sparsely pubescent cyathiform cupule 2 mm. long at most, 7 mm. in diameter, and about 1 mm. deep, with a minutely undulate margin. The subtending pedicel is pubescent, short, and thick, 2-3 mm. long and about 1.5 mm. in diameter at the apex.

The narrower leaves with more numerous lateral nerves and more persistent pubescence separate this species from the Costa Rican and Panamanian *N. Woodsoniana*. The floral structure is very like that of *N. salicifolia*, but the foliage characters are quite different.

27. *Nectandra Loeseneri* Mez in Bull. Herb. Boiss. II. 5: 243. 1905.

DISTRIBUTION: Reported only from type-locality and vicinity in Vera Cruz and adjacent Tamaulipas, along the northeastern coast of Mexico.

MEXICO: Tamaulipas: Coastal dunes north of Tampico, *LeSueur* 146 (fl., Ch), *Pringle* 7685 (fl., GH); vicinity of Gómez Fárias, *E. Palmer* 272 (fl., GH). Vera Cruz: Island of Juana Ramirez, about 56 km. south of Tampico, *E. Palmer* 458 (fl., GH); vicinity of Pueblo Viejo, 2 km. south of Tampico, *E. Palmer* 360 (fr., Ch, GH, NY); in the primeval forest, between Cazones and Tuxpam, Jan. 4, 1903, *C. & E. Seler* 3696 (fl., photo. of TYPE, GH); Cazones, *Mell* s.n. (fl., NY); Coatzacoalcos, isthmus of Tehuantepec, *C. L. Smith* 985 (fl., GH, NY), 1116 (fl., NY).

NATIVE NAME: "Laurel" (Vera Cruz).

The branchlets of this species are slender, glabrous, terete, and, according to Mez, shining. The leaves are borne on slender petioles which are glabrous, canaliculate, and about 1 cm. long. The blades are chartaceous, shining above, elliptic, cuneate at the base and obtuse or shortly and obtusely acuminate at the apex. They measure up to 11 (rarely -17) cm. long and 3-4 (rarely -9) cm. broad, the loose reticulation being prominent on both surfaces. The costa and lateral nerves, of which there are 5-7 pairs, are very slightly elevated above and prominently so beneath. The lateral nerves diverge from the costa at an angle of 25-35 (-45)° and bear in their axils conspicuous pubescent glands. The inflorescence consists of more or less subcorymbose panicles 8-10 cm. long, with few or many flowers, shortly pubescent and borne on long peduncles up to 6 cm. The flowers are about 3 mm. long with a diameter up to 8 mm. The perianth-tube is very short, the lobes oblong-elliptic, \pm 3.5 mm. long, rather thick, and papillose on the inner surface. The stamens of the two outer series are \pm 0.8 mm. long, with subreniform anthers nearly twice as long as the stout pubescent filaments. Those of the third series are \pm 1 mm. long and have anthers which are squarish, emarginate, the two upper cells lateral, the two lower lateral-extrorse, the anthers equalling the filaments in length. The filaments bear two large sessile glands nearly the size of the anthers. The staminodia are small, \pm 0.8 mm. long, more or less triquetrous, subtended by stipes pubescent at the base, which are nearly two-thirds the entire length. The glabrous gynaecium is \pm 1.4 mm. long, the ovary ellipsoid-ovoid, four times the length of the short stout style with its flat triangular stigma. The fruiting specimen *Palmer* 360 seems to match very well the other material. The fruit is globose, apiculate, black in the dried state, about 12 mm. in diameter, subtended by a shallow cyathiform cupule 3 mm. long, 5 mm. broad, and about 1 mm. deep, with a slightly undulating

margin. The pedicel is somewhat slender, up to 5 mm. long and expanded to about 1.5 mm. at the apex.

Although there is only a photograph of the type for comparison, there seems no doubt that the cited numbers may be safely referred to the above species. The nearest relative is *N. salicifolia*. The shape of the leaves and the rather more conspicuous reticulation recall the characters of *N. coriacea*, but in the latter the leaf-blades are more heavily coriaceous and the venation obscured by the reticulation. The floral characters are definitely those of *N. salicifolia*.

28. *Nectandra Skutchii*, sp. nov.

Arbor ad 23 m. alta, ramulis sparse et minutissime ferrugineo-pubescentibus mox atro-rubescensibus glabris sulcatis angulatis. Folia alternata, petiolis minute adpresso subferrugineo-pubescentibus canaliculatis, ad 1 cm. longis et 2 mm. latis, laminis supra glabris subitus basi costae excepta glabris, membranaceis, in sicco supra pallide viridescentibus subitus minus pallidis, oblongo-ellipticis, ad 20 cm. longis et 6.5 (–7) cm. latis, basi attenuato-cuneatis, in petiolum decurrentibus ibique recurvatis, apice sub-caudato-acuminatis, pinninerviis, costa utrinque castanea supra impressa subitus valde elevata, nervis 4–6-paribus castaneis, subitus obscuris impressis subitus elevatis arcuatis angulo 35–45° divergentibus, rete venularum utrinque obscuro et leviter subcancellato. Inflorescentia axillaris anguste paniculata, ad 8.5 cm. longa, minute adpresso pubescens, pauciflora, pedunculo ad 2.5 cm. longo. Flores ad 2.5 mm. longi, pedicellis ad 2 mm. longis, pubescentibus, perianthio infundibuliformi, albo, lobis oblongis obtusis reflexis crassis papilloso-tomentosis, ± 1.7 mm. longis; staminibus ser. I & II ± 0.7 mm. longis, antheris subreniformibus emarginatis filamentis flabeliformibus aequalibus, ser. III ± 0.8 mm. longis, obovatis emarginatis biglandulosis, glandulis et antheris filamentis aequalibus; staminodiis ± 0.4 mm. longis, stipitatis, subtriquetris; gynaecio glabro ± 1.7 mm. longo, ovario globoso 1½ stylo longiore, stigmate conspicuo discoideo. Fructus globosus, apiculatus, in sicco brunneus, ad 10 mm. diam. cupula vadose et patente subcampanulata conspicue verrucosa tenui erosa leviter undulata glabra 5–6 mm. longa, 10–12 mm. lata, et 3 mm. alta subtentus, pedicello incrassato verrucoso glabro 7–10 mm. longo.

DISTRIBUTION: Known only from Costa Rica, at altitudes of 670–850 m.

COSTA RICA: San José: Vicinity of El General, alt. 850 m., July, 1936, *Skutch* 2668 (fl., TYPE — GH, NY) (tree 23 m.; flowers white), 4182 (fr., A, NY).

The affinity of this species is with the *N. globosa* group, in spite of the difference in floral structure, namely the subreniform anthers and the longer style.

29. *Nectandra Standleyi*, sp. nov.

Arbor 6–13 m. alta, ramulis novellis minute et dense fulvo- vel subferrugineo-pubescentibus, angulatis, mox glabrescentibus, striatis griseis vel atro-brunneis. Folia alternata, petiolis satis robustis fulvo-tomentosis canaliculatis ad 1.5 cm. longis, laminis supra minute et inconspicue pubescentibus mox glabris, subitus utrinque minute adpresso pubescentibus, coriaceis, in sicco brunneis, ellipticis, ad 16 (–17) cm. longis et 4.5 (–6) cm. latis, basi obtusis vel subrotundatis imis recurvatis et ut videtur cuneatis, apice attenuato-acuminatis vel caudato-acuminatis, pinninerviis, costa

supra impressa subtus elevata, nervis 4 (raro -8)-paribus, supra impressis subtus elevatis, angulo 25-35° divergentibus, rete venularum utrinque obscurum. Inflorescentia axillaris vel subterminalis fulvo- vel griseo-pubescentia, paniculata, multiflora, ad 15 (-20) cm. longa, pedunculo ad 6 mm. longo. Flores ad 3 mm. longi, pedicellis 2 mm. longis pubescentibus, perianthio albo vel fulvo-flavescens, fide coll., campanulato, lobis reflexis carnosis ellipticis rotundatis + 1.7 mm. longis extus pubescentibus intus papillosis; staminibus ser. I & II \pm 0.6 mm. longis, antheris subreniformibus subemarginatis subsessilibus, ser. III \pm 1 mm. longis, antheris truncatis, subemarginatis, filamentis aequalibus lateraliter glandulis basi conspicuis subglobosis filamentis subaequalibus; staminodia subovoideis \pm 0.6 mm. longis, stipitibus dimidio aequalibus; gynaecio glabro, ovario stylo paulo longiore, stigmate subtriangulari discoideo conspicuo. Fructus subglobosus 1 (-1.3) cm. diam. (viridis, fide coll.), cupula campanulata glabra verrucosa margine irregulariter vadose lobata, ad 6 mm. longa, 12 mm. diam. et 3 mm. alta subtentus, pedicello robusto verrucoso ad 8 mm. longo et 4-5 mm. diam. apice expanso.

DISTRIBUTION: Costa Rica and adjacent Panama.

COSTA RICA: Alajuela: San Luis de Zarcero, *A. Smith* 164 (fl., Ch); region of Zarcero, *A. Smith* A.243 (fl., A, Ch, NY); (La Cidra) de San Ramón, *Brenes* 3850 (3) (fr., Ch); without precise locality, presumably San Ramón, *Brenes* 4061 (fl., TYPE, Ch); Piedades near San Ramón, *Brenes* 4344 (fl., Ch); hills of San Pedro de San Ramón, *Brenes* 4780 (565), 4794 (579), 5019 (175) (fl., Ch), 5443 (36) (fr., Ch); Cerro de Palma de San Ramón (El Socoro), *Brenes* 5714, 5733, 5831 (423), 16833 (fl., Ch). San José: La Caja, *Valerio* 1326 (fl., Ch). Cartago: El Muñeco, on Río Navarro, *Standley & Torres* 50908 (fr., Ch). Limón(?): La Concepcion, Llanuras de Santa Clara, *J. D. Smith* 6757 (fr., GH). PANAMA: Bocas del Toro: Cricmola, near Almirante, *G. P. Cooper* 488 (fl., Ch, NY); vicinity of Chiriquí Lagoon, Big Bight, *von Wedel* 2884; Isla Colon, *von Wedel* 2967 (fl., A).

NATIVE NAMES: "Aguacatillo," "Quizzerá," "Guizarrá quina" (Costa Rica); "Sigua" (Panama).

This species is very similar to *N. globosa* and *N. ramonensis* in foliage-characters, differing from the former in having fewer pairs of lateral nerves, from the latter in having larger leaf-blades, and from both by its smaller flowers with the anthers devoid of the large papillose connective characteristic of the two above-mentioned species. The long stout style, which equals or subequals the length of the ovary and is topped by a conspicuous somewhat triangular discoid stigma, presents further differentiating characters. The fruiting cupule is less shallow in *N. Standleyi* and has a tendency to be subglobose.

The specimens from Chiriquí Lagoon are doubtfully referred to this species, because of the variation in the leaf-shape and the presence of pubescence on the small staminodia.

30. *Nectandra producta*, sp. nov.

Arbor ad 30 m. alta, ramulis argenteo-fulvo-sericeo-pubescentibus striatis valde angulatis. Folia alternata longipetiolata, petiolis conspicue alatis gracilibus vadose canaliculatis pubescentibus ad 5 cm. longis, ut videtur, et ad 3.5 cm. latis, laminis juventute conspicue puncticulatis, lucidis, supra glabris subtus minute molliter et inconspicue pubescentibus, membranaceis vel chartaceis, in sicco viridibus, elliptico-lanceolatis vel leviter oblanceo-

lato-ellipticis, ad (8-) 12 cm. longis et 2.5-4 cm. latis, basi attenuato-cuneatis, in petiolum longum decurrentibus ibique valde recurvatis, apice acutis vel attenuato-subacuminatis, penninerviis, costa supra flavescente conspicua subplana et basi pubescente subtus elevata pubescente, nervis ad 10-12-paribus supra tenuibus conspicuis flavescentibus subtus obscuris angulo 45-55° divergentibus. Inflorescentia axillaris paniculata, ad 15 cm. longa, leviter pubescent, multiflora, pedunculo ad 4 cm. longo. Flores 2.5-3 mm. longi, pedicellis ad 3 mm. longis gracilibus glabrescentibus, perianthio campanulato viridescente, lobis late ellipticis obtusis crassis dense papilloso-tomentosis, \pm 2.15 mm. longis; staminibus ser. I & II \pm 0.8 mm. longis, antheris longis aequidem ac latis filamento duplo longioribus, ser. III \pm 1.4 mm. longis biglandulosis, glandulis et antheris oblongis filamenti aequalibus; staminodiis anguste oblanceolato pubescente ad \pm 0.6 mm. longo; gynaecio glabro, \pm 2.4 mm. longo, ovario ellipsoideo stylo gracili aequali, stigmate discoideo satis conspicuo. Fructus ignotus.

DISTRIBUTION: Known only from the type-locality, in Costa Rica.

COSTA RICA: San José: In forest in the vicinity of El General, alt. 700 m., Jan. 1939, Skutch 3906 (fl., TYPE—A, NY) (tree 30 m., with prop-roots; flowers greenish).

Nectandra producta, so-named because of the long apparent petioles, belongs in the same general vicinity with *N. Whitei* and *N. hypoglaucia*. The branchlets are rather like those of the latter in that they are thick, angled, and fulvous-sericeous, becoming grayish and striate with age. The leaf-blades are similar in many respects to those of the former species, but are borne on extremely long apparent petioles of 5 cm. in length, formed by the narrowly and conspicuously decurrent leaf-base, being sericeous throughout. Even though the fruit is unknown, the species stands out for its unusual leaves, with the blades narrowly decurrent, forming an apparent petiole of so great a length.

31. *Nectandra Whitei* (Woodson), comb. nov.

Ocotea Whitei Woodson in Ann. Mo. Bot. Gard. 24: 188. 1937.

DISTRIBUTION: Western Panama and Costa Rica, up to 2000 m. altitude.

COSTA RICA: Without locality, Little 6059 (fr., Ch). Alajuela: Pastures of La Paz de San Ramón, Brenes 4262 (47) (fr., Ch). Limón: Inland from Sequirres, Stork 2809 (Y 38450) (fr., Y). PANAMA: Chiriquí: Valley of the upper Rio Chiriquí Viejo, vicinity of Monte Lirio, alt. 1300-1900 m., June 27-July 13, 1935, Seibert 307 (fl., A, TYPE—Mo, NY) (tree 30 m.; flowers light greenish yellow; fruit green; cupule red; aromatic); trail from Paso Ancho to Monte Lirio, P. H. Allen 1486 (fr., Ch, GH, Mo, NY).

NATIVE NAMES: "Ira," "Ira rosa" (Costa Rica); "Bambito" (Panama).

The present species has slender branchlets that are minutely and closely fulvo-sericeous, becoming glabrous, grayish, and striate. The actual petioles are slender, glabrous or glabrescent, and about 1 cm. long. The coriaceous blades are oblanceolate, narrowly attenuate at the base and recurved, giving the appearance of a long winged petiole of 3 cm., up to 12 cm. long and 3.5 cm. broad, with the broadest portion above the middle of the blade; the apex is obtuse or obtusely acuminate. The young leaves are early fulvo-sericeous, becoming glabrous above and less conspicuously pubescent beneath. The costa is slightly elevated above and more prominently so beneath, but conspicuous everywhere. The lateral nerves, of which there are up to 12 pairs, are not very conspicuous and

diverge at an angle of 35–45°. The axillary or subterminal paniculate inflorescence is up to 13 cm. long, subtended by a stout reddish black peduncle up to 6 cm. long. The pubescent light greenish yellow flowers are about 3 mm. long, supported by a slender pubescent pedicel not more than 2 mm. long. The ovate-elliptic lobes are rather thick and ± 2.15 mm. long. The two outer series of stamens are ± 1 mm. long, the subglobose anthers twice the length of the stout filaments. The stamens of the inner series are ± 1.25 mm. long, the squarish anthers almost equalled by the filaments and the two basal sessile subglobose glands. The glabrous gynoecium measures ± 2.15 mm., the ovoid ovary slightly exceeding the rather stout style with its subtriangular flat decurrent stigma. The fruits are oblong or in the younger stages presumably ellipsoid, the apex in the dried state remaining conspicuously shining and unwrinkled, drying in a more or less regular star-shaped pattern, black at maturity, up to 4 cm. long and 1.5 cm. in diameter, the surface frequently tuberculate. The cyathiform red verrucose subtending cupule is up to 6 mm. long, 13 mm. in diameter, and 2–3 mm. deep, the margin gently undulating. The pedicel is verrucose, striate, up to 15 mm. long at times, and 6 mm. in diameter at the apex.

The long fruits distinguish this species from any other from the area under study. It is near *N. Paulii* and *N. producta*, distinguished from the latter by shorter apparent petioles, and from the former by its chartaceous leaf-blades that are much smaller and with more prominent reticulation, and by its shorter inflorescences.

32. *Nectandra hypoglauca* Standley, sp. nov.

Arbor 15–21 m. alta, ramulis fulvo-sericeis, mox griseis, striatis, juventute angulatis. Folia alternata, petiolis alatis robustis pubescentibus, 2 (–2.5) cm. longis et ad 4 mm. latis, laminis supra nitidis glabris basi costae excepta, subtus pubescentibus, glaucis, coriaceis, in sicco olivaceo-brunneis, obovato-ellipticis, ad 18 cm. longis et 8 cm. latis, basi attenuato-cuneatis, in petiolum decurrentibus ibique plus minusve valde recurvatis, apice rotundatis leviter obtuse et abrupte acuminatis, penninerviis, costa supra leviter impressa subtus satis elevata robusta, nervis 6–9 (–10)-paribus supra haud subtus nonnihil elevatis plus minusve castaneis angulo $\pm 40^\circ$ divergentibus, rete venularum supra utrinque conspicuo. Inflorescentia axillaris, juvenili bracteis adhuc onusta, paniculata, ad 18 cm. longa, dense fulvo-tomentosa, longipedunculata, pedunculis robustis striatis angulatis ad 8 cm. longis. Flores dense fulvo-tomentosi, ± 3.5 mm. longi, pedicellis ad 4 mm. longis tomentosis, perianthio campanulato, canescente fide coll., fulvo-tomentoso, lobis ovatis obtusis crassis, ± 2.5 mm. longis; staminibus ser. I & II ± 1 mm. longis, antheris ovatis. connectivo antherae $\frac{1}{3}$ longitudine aequante filamento duplo longioribus, ser. III ± 1.25 mm. longis biglandulosis, antheris oblongis truncatis glandulis filamentisque duplo longioribus; staminodiis lato-lanceolatis ± 0.75 mm. longis; gynoecio glabro ± 1.7 mm. longo, ovario ovoideo-globoso stylo duplo longiore, stigmate peltato conspicuo. Fructus in sicco flavescens-brisneos-maculatus, obovideo-ellipticus, conspicue et obtuse apiculatus, 2.2×2 cm., cupula campanulata rugosa verrucosa glabra margine leviter undulata, ad 1 cm. longa, 1.7 cm. diam., et 5 mm. alta subtentus, pedicello incrassato glabro, ad 15 mm. longa apice ad 5 mm. lata.

DISTRIBUTION: Known only from the type-locality, in Panama.

PANAMA: Chiriquí: Bajo Mono, Boquete, in rain-forest, alt. 1340 m., April 9, 1938, *Davidson* 531 (fl., Ch, TYPE—Mo; fr., A, Ch) (tree 15–21 m.; flowers white).

Nectandra hypoglauca is similar to *N. Whitei* and *N. producta*, which see for discussion.

33. *Nectandra Paulii*, sp. nov.

Arbor ad 30 m. alta, ramulis robustis sulcatis minute fulvo-tomentosis mox griseo-pubescentibus vel glabrescentibus. Folia alternata juventute sparse adpresso minute fulvo-pubescentia mox glabrescentia demum glabra, petiolis robustis pubescentibus vadose canaliculatis ad 2 cm. longis et 4 mm. latis, laminis supra utrinque glabris basi costae excepta, subtus minute pubescentibus, juventute membranaceis mox coriaceis, in sicco supra viridescenti-brunneis, subtus pallidioribus subglaucis, ellipticis vel obovato-ellipticis, ad 15 cm. longis et 7 cm. latis, basi cuneatis, in petiolum decurrentibus ibique satis recurvatis, apice acutis, acuminatis, vel rotundatis, raro emarginatis. margine leviter recurvatis, penninerviis, costa robusta supra conspicua subtus valde elevata, nervis (6–) 7–8 (–9)-paribus supra conspicuis sed leviter impressis, subtus elevatis angulo 35–45° divergentibus, rete venularum utrinque obscurum. Inflorescentia axillaris, late paniculata, ad 30 cm. longa, pubescens, multiflora, longipedunculata, pedunculo robusto pubescente, ad 10 cm. longo. Flores ad 3 mm. longi, pedicellis 1–3 mm. longis gracilibus, perianthio hypocrateriformi albo, fide coll., lobis oblongis, reflexis, crassis, papilloso-tomentosis, ± 2.5–3 mm. longis; staminibus ser. I & II ± 0.6 mm. longis, antheris subreniformibus vel depresso-globosis filamento duplo longioribus, ser. III ± 0.8 mm. longis conspicue biglandulosis, glandulis et antheris quadratis filamentis aequalibus; stamnodes ob lanceolatis pubescentibus ± 0.6 mm. longis; gynaeio glabro, ± 1.25 mm. longo, ovario subgloboso, stylo subnullo, stigmate subsessili rotundato conspicuo. Fructus ellipsoideus, apiculatus, 28 × 17 mm., cupula rubra campanulata crassa verrucosa glabra ad 8 mm. longa, 15 mm. diam., et 5 mm. alta subtentus, pedicello incrassato pubescente striato, ad 1 cm. longo et apice 8 mm. lato.

DISTRIBUTION: In Costa Rica, up to 915 m. altitude, and in Chiriquí Province of Panama, at 1500–2000 m. altitude.

COSTA RICA: San José: Forests in the vicinity of El General, alt. 915 m., Feb. 1936, *Skutch* 2605 (fl., TYPE—A, GH, NY) (tree 30 m.; flowers white). PANAMA: Chiriquí: Bajo Mono, mouth of Quebrada Chiquero, along Río Caldera, *Woodson*, *Allen & Seibert* 1022 (fr., A, Ch, Mo, NY); vicinity of Cerro Punta, *Paul H. Allen* 1572 (fr., Ch, GH, Mo).

The lack of well developed connective tissue of the outer series of anthers, and the sessile stigma and globose ovary distinguish the flowers of *N. Paulii* from those of *N. hypoglauca*. The fruiting pedicel is shorter than that of *N. hypoglauca*, and the fruit is ellipsoid rather than ovoid-ellipsoid.

34. *Nectandra belizensis* (Lundell), comb. nov.

Phoebe belizensis Lundell in Contr. Univ. Mich. Herb. 6: 20. 1941.

DISTRIBUTION: Known only from the type-locality and vicinity, in British Honduras.

BRITISH HONDURAS: Stann Creek: Creek-side, Mountain Cow Ridge, *Gentle* 3281 (fr., A, NY); Mountain Cow Ridge, in high ridge, March 31, 1940, *Gentle* 3304 (fl., ISOTYPE, A, NY) (tree 25 cm. diam.; flowers white); Big Eddy Ridge, *Gentle* 3346 (fr., A, NY).

NATIVE NAMES: "Timbersweet," "White laurel" (British Honduras).

This tree, described under the genus *Phoebe*, certainly resembles the latter genus in habit-characters, particularly the species *P. helicterifolia*. The softly ferruginous-tomentose young branchlets and petioles are characteristic, as well as the oblong chartaceous to subcoriaceous pale leaf-blades with the rounded bases and abruptly and sharply acuminate apices. The blades are 11–22 cm. long and up to 8.5 cm. broad. The costa is impressed above and retains its early pubescence, whereas the lateral nerves, of which there are 6–8 pairs, are merely impressed, diverging at an angle of 45–55°. The reticulation, which is also impressed above and not too conspicuous, stands out prominently beneath. The few-flowered axillary inflorescences are up to 10 cm. long and borne on slender softly pubescent peduncles up to 5 cm. long. The white flowers are about 8–9 mm. in diameter, the thick ovate lobes up to 3 mm. long and pubescent without. The stamens of the two outer series are ± 0.8 mm. long, the broadly obovate anthers are nearly sessile, and the connective is slightly prominent. Those of the inner series are ± 1.25 mm. long, subrectangular, the large conspicuous glands equaling the filaments and anthers in length. The staminodia are thin, triangular, less than 0.4 mm. long. The glabrous gynoecium measures ~ 1.25 mm. long; the subglobose ovary is topped by a very short style bearing an inconspicuous discoid stigma. The fruit is glabrous, ellipsoid, apiculate, up to 1 (-1.3) cm. long and 6 ($-?$) mm. broad, the thin shallow pubescent to glabrescent cupule not more than 4 mm. long and about 5 mm. in diameter, the slender pubescent to glabrescent pedicel from 5 mm. to 1 (-1.7 ?) cm. long.

The lack of conspicuous staminodia, the short-styled globose ovary, the form and development of connective-tissue in the anthers, and the shape of the anthers themselves all seem to point to the fact that this species should be included under *Nectandra*. The fruits of the numbers cited above appear to be immature.

35. *Nectandra rufa*, sp. nov.

Arbor (?), ramulis angulatis atro-brunneis verruculosis minute et obscure pubescentibus. Folia alternata, petiolis robustis glabrescentibus haud canaliculatis, ad 3 cm. longis et 4 mm. latis, laminis utrinque glabris percoratis in sicco brunneis, supra nitidis, ellipticis, ad 20 cm. longis et 8 cm. latis, basi cordatis recurvatis, apice ignotis, penninerviis, costa supra rubescente et leviter impressa subtus conspicue elevata, nervis ad 10-paribus supra rubescentibus leviter elevatis subtus elevatoribus angulo 35–45° divergentibus, rete venularum supra conspicuo subtus obscuro. Inflorescentia axillaris et subterminalis late paniculata, ad 13 cm. longa, minute adpresso pubescens, multiflora, pedunculo robusto ad 5 cm. longo. Flores ad 6 mm. longi, dense ferrugineo-pubescentes, pedicellis pubescentibus satis robustis ad 5 mm. longis, perianthio late campanulato, lobis late ellipticis obtusis (mox reflexis) crassis papilloso-tomentosis ad 4 mm. longis; staminibus ser. I & II ± 1.25 mm. longis antheris subglobosis filamento basi pubescente duplo longioribus, ser. III ± 1.25 mm. longis biglandulosis, antheris oblongis, glandulis aequalibus, longitudine $\frac{2}{3}$ staminium aequantibus; staminodiis nullis; gynoecio glabro ± 1.7 mm. longo, ovario globoso brevistipitato stylo approx. duplo longiore, stigmate parvo discoideo. Fructus ignotus.

DISTRIBUTION: Known only from type-locality.

MEXICO: Chiapas: Mt. Ovando, Dec. 29, 1936, *Matuda* 470 (fl., TYPE, A).

This robust species, known only from the flowering specimen, seems to be distinct enough to warrant description without fruiting material. It is perhaps most nearly related to *N. sinuata*, in spite of the glabrous leaves and ovary and the roundish stamens with very little connective tissue protruding at the apex of the anthers.

36. *Nectandra platyphylla* (Lundell), comb. nov.

Phoebe platyphylla Lundell in Contr. Univ. Mich. Herb. 6: 23. 1941.

DISTRIBUTION: Known only from the type-locality, in Mexico.

MEXICO: Chiapas: Finca Suiza near Montecristo, Jan. 1938, *Matuda* 1930 (fl., ISOTYPE, A, NY).

The branchlets of this tree are angled, at first dark and minutely puberulous, later becoming glabrous, terete, striate, and often grayish. The pedicels are rather slender, canaliculate, puberulous, and up to 1.5 cm. long. The membranaceous leaf-blades are yellowish green, at first minutely sericeous, becoming quickly glabrescent on both surfaces except for the frequent presence of pubescent axillary glands beneath. They are oblong-elliptic or obovate-elliptic, the base rounded and often abruptly cuneate with a tendency toward recurving, the apex obtuse or obtusely acuminate or occasionally acutish, and measure 9–25 cm. long and 4.5–11.5 cm. broad. The costa is slender, impressed above and somewhat elevated beneath. The lateral nerves, of which there are 6–12 slender pairs, are only slightly elevated above and little more beneath, visible but not conspicuous, and diverge at an angle of about 45°. (The isotype has leaves on the whole much smaller than the length and breadth given by Lundell.) The inflorescence is axillary, glabrous or at least glabrescent, up to 10 (–15) cm. long, few-flowered, the slender dark brownish red peduncle up to 6 cm. long. The white flowers are large, about 1 cm. in diameter, supported by filamentous pedicels up to 1 cm. long. The lobes are 4 (–5) mm. long, broadly elliptic, obtuse to rounded, fleshy, papillose, the tube short. The stamens of the two outer series are \pm 2.15 mm. long, with sessile anthers elliptic, obtuse, and petaloid. Those of the inner series have anthers that are subrectangular, rounded, and borne on filaments about one-third their length and completely covered by two conspicuously large glands that are as large as the anthers. The staminodia are subtriquetrous, stipitate, \pm 1 mm. long. The glabrous gynaecium is \pm 2.15 mm. long, compressed-globose, with a very short thick style topped by a triangular conspicuous stigma.

Lundell places this near *Phoebe ambigens*, from which it may be distinguished by leaf-blades that are more frequently obovate-elliptic than elliptic, membranaceous rather than subcoriaceous, and by smaller flowers, the styles of which are extremely short.

37. *Nectandra sinuata* Mez in Jahrb. Bot. Gart. Berlin 5: 402. 1889; Standley in

Contr. U. S. Nat. Herb. 23: 297. 1922; Standley & Calderón, Lista Prelim. Pl. Salvador 84. 1925; Standley in Field Mus. Publ. Bot. 18: 453. 1937.

Persea Matudai Lundell in Lloydia 4: 49. 1941.

DISTRIBUTION: Southern Mexico through Central America.

MEXICO: Oaxaca: Vicinity of Cafetal Concordia, *Morton & Makrinius* 2486 (fr., Ch); Cafetal San Antonio, Pochuntla, *Reko* 6039 (fl., GH). Chiapas: Las

Cadenas, Escuintla, January 5, 1938, *Matuda* 1880 (fl., isotype of *Persea Matudai*, A, Ch, NY). GUATEMALA: Quezaltenango: Coffee plantations, Colombia, *Skutch* 1978 (fl., A, NY); Finca Pirineos, lower south-facing slopes of Volcán Santa María, between Santa María de Jesús and Calahuaché, *Steyermark* 33234 (fl., Ch). Zacapa: Trail between Santa Rosalía de Mármol and Vegas, *Steyermark* 42961 (fl., Ch). Chiquimula: Around the crater-lake, Volcán de Ipala, *Pittier* 1874 (fl., GH). Guatemala: Near Finca La Aurora, *Aguilar* 279 (fr., Ch). Sacatepéquez: Near Barranco Hondo, southeast of Alotenango, dry thicket, *Standley* 64949 (fl., A, Ch). Retalhuleu: Near Retalhuleu, *Bernoulli & Cario* 2581 (fl., TYPE of *Nectandra sinuata* not seen). Suchitepéquez: Finca Mocá, *Skutch* 1489 (fl., Ch); *Bequaert* 55 (fr., Ch, GH). Santa Rosa: Chiapas, *Heyde & Lux* 4374 (fl., GH, NY). HONDURAS: Dept. unknown, Cerro del Guayabal, S. *Calderón* 2012 (fl., GH). Ahuachapán: Vicinity of Ahuachapán, along stream, *Standley* 19959 (fl., GH, NY); Sierra de Apaneca, in the region of Finca Colima, *Standley* 20095 (fl., GH, NY). EL SALVADOR: San Salvador: Volcán de San Salvador, S. *Calderón* 473 (fl., GH), *Standley* 22968 (fl., GH, NY); cerro de San Jacinto, S. *Calderón* 2248, *Standley* 20629 (fl., GH, NY). La Paz: Zacatecoluca, S. *Calderón* 308 (fr., GH, NY). COSTA RICA: Alajuela: San Pedro de San Ramón, *Brenes* 6817, 15090 (fl., Ch); San Francisco de Guadalupe, *Pittier* 12348 (fr., Ch, GH); Naranjo, Cerro del Espíritu Santo, in thicket in reddish clay-loam of Pacific tropic zone, *A. Smith* P.2409 (fl., A); Alajuela, *J. D. Smith* 6754 (fl., GH, NY). San José: About the Hacienda Belmira, near Santa María de Dota, *Tonduz* 11651 (fl., Ch, GH). Cartago: Near Cartago, *Skutch* 4687 (fl., A, NY).

NATIVE NAMES: "Aguacamico," "Aguacate amarillo," "Aguacate de mico" (El Salvador); "Aguacatillo" (Mexico); "Chipinahuaca," "Palo de Chipinahuaca" (El Salvador); "Palo de Tejón" (Mexico); "Quisarrá," "Quisarrá hedionda" (Costa Rica); "Tepeaguacate rojo" (Guatemala); "Trompillo," "Trompito" (El Salvador).

This is a very well known species occurring throughout most of Central America and adjacent Mexico. The stout angled branchlets are clothed with a fulvous or grayish tomentum. The densely tomentose pedicels are somewhat canaliculate, robust, and up to 3 cm. long. The oblong-elliptic or obovate blades are cordate at the base, the apex subobtuse, rounded or abruptly subacuminate or abruptly and sharply acuminate, 25 (-30) cm. long and 12 (-19) cm. broad, chartaceous, densely grayish- or fulvous-tomentose beneath and more sparsely pubescent above, the costa and nerves heavily tomentose. The costa and slender lateral nerves, of which there are 9-11 (-15) pairs diverging at an angle of 45-70 (-80)° (the lowermost almost at right angles), are conspicuous above because of their pubescence and are prominently elevated as well as pubescent beneath. The inflorescence is a stout subcorymbose or pyramidal many- or few-flowered axillary panicle, usually densely pubescent, up to 25 cm. long, the robust peduncle up to 16 cm. long. The large flowers are up to 1 cm. long and nearly 2 cm. in diameter, the tomentose pedicels 5-10 (-12) mm. long. The fleshy lobes are densely tomentose without and heavily papillose within, broadly ovate or elliptic, subacute to obtuse or round, reflexed at anthesis and in the dried state castaneous or occasionally dark brown. The two outer series of stamens are 3 mm. long, the elliptic or ovate anthers sessile or subsessile, usually variously petaloid, heavily papillose, the fleshy connective tissue of the anthers occupying at least one-third of their entire length. The stamens of the inner series are \pm 3.4-4 mm. long, oblong-truncate, the cells sublaterally extrorse and the filaments with conspicuous sessile basal glands about one-third the length of the stamens. The usually densely pubescent (sometimes glabrous) gynoecium is \pm 3 mm. long, the

subglobose ovary equalling in length the stout style with its conspicuous subtriangular decurrent stigma. The ellipsoid fruit measures up to 2.5 cm. long and 17 mm. in width, the supporting campanulate glabrescent to glabrous cupule measuring up to 13 mm. long, 2.5 cm. in diameter, and about 10 mm. deep, the pedicel enlarged to 13 mm. long and about 11 mm. diameter at the apex. In the dried state the cupule flares away from the fruit instead of surrounding it closely. The upper half of the fruit is glabrous except for the entire tip, which is covered with persistent pubescence. Approximately the lower third to half, which is almost entirely hidden by the cupule, is densely fulvous-sericeous-tomentose.

The above description is applicable to the majority of specimens of the species. All of the material from San Salvador shows flowers with glabrous ovaries. Some of the Guatemalan specimens are less tomentose as to foliage and inflorescence in general. Nonetheless, it is apparent that they all belong under the same widely variable species.

38. *Nectandra reticulata* (Ruiz & Pavon) Mez in Jahrb. Bot. Gart. Berlin 5: 404. 1889; Standley in Contr. U. S. Nat. Herb. 23: 297. 1922, in Field Mus. Publ. Bot. 18: 453. 1937.

Laurus reticulata Ruiz & Pavon, Fl. Peruv. Chil. 4: t. 348, & Laurogr. t. 23. 1802.

DISTRIBUTION: Tropical America from Mexico into Central and South America.

MEXICO: Puebla: Zonquimistlan, C. & E. Seler 3643 (fl., GH). Oaxaca: Chiltepec and vicinity, Tuxtepec, in llanos, Martínez-Calderón 488 (fl., A). Chiapas: Escuintla, Matuda 383 (fl., A, NY). GUATEMALA: Alta Verapaz: South of Cubilgüitz, in thickets, Steyermark 44561 (fl., Ch); Hacienda Yaxcabnal, Steyermark 45093, 45094 (fl., Ch); Cubilgüitz, von Tuerckheim 7965 (fl., GH, NY). Quezaltenango: Colombia, in coffee plantations, Skutch 1988 (fl., A, NY). Retalhuleu: Retalhuleu, Kellerman 6587 (fl., Ch); vicinity of Las Delicias, south of Retalhuleu, Standley 88121 (fl., Ch); vicinity of Retalhuleu, Standley 88822 (fl., Ch). HONDURAS: Mosquitia(?): Black River Valley, Record & Kuylen H. 69 (Y 10015) (fl., Y). NICARAGUA: Bluefields: Region of Braggman's Bluff, Englesing 65,123 (fl., Ch). COSTA RICA: Alajuela: San Pedro de San Ramón, Brenes 6586 (fl., Ch), Tonduz 17692 (fl., Ch). San José: Vicinity of El General, in clearings, Skutch 2490 (fl., A, NY). PANAMA: Bocas del Toro: Changuinola Valley, Island Potrero, Dunlap 22a (fl., Ch); Changuinola Valley, G. P. Cooper 32 (Y 10132) (fr., Ch); region of Almirante, Cricamola along river, Cooper & Slater 512 (fr., Ch). Canal Zone: Forest along the Río Indio de Gatun, Pittier 2775 (fl., GH, NY); in swampy woods, Lion Hill Station, Hayes 467 (fl., US); Mindi, Cowell 182 (fl., NY). [PERU: Without locality, Pavon 504 (fl., ISOTYPE of *Laurus reticulata*, Ch.).]

NATIVE NAMES: "Aguacatilla" (Honduras); "Chuala" (Guatemala); "Sweetwood" (Panama).

This widespread species is conspicuous for its densely ferruginous-tomentose branchlets and inflorescences. The stout petioles, up to 1.5 cm. long, as well as the lower surface of the leaf-blades, are densely tomentose. The blades are coriaceous, glabrous above except for the venation, lanceolate-elliptic or oblong-elliptic, the base auriculate and strongly recurved, the apex attenuate-acuminate, sometimes up to 30 cm. long, and as broad as 9 cm. The costa and lateral nerves are impressed and pubescent above, prominently elevated and densely pubescent beneath. The lateral nerves number up to 12 pairs and diverge at an angle of 35-45°. The reticulation is pronouncedly impressed above and conspicuously elevated beneath. The inflorescence is stout, axillary, many-flowered, ferruginous-tomentose, paniculate, usually with long peduncles up to 10 cm. long. The densely

tomentose flowers are large, up to 7 cm. or more long and 10–15 mm. in diameter, the pedicel 4–5 mm. long, often less. The inner surface of the tube is frequently densely hairy. The fleshy tomentose lobes are ovate, obtuse or rounded, and papillose within, measuring nearly 6 mm. long, the inner being slightly shorter than the outer. The stamens of the two outer series are variable in size, up to \pm 2.4 mm. long, and the almost sessile anthers vary in size from depressed-globose to ovate and almost petaloid, the connective tissue occupying usually about half the length of the anther. The stamens of the inner series are also variable in length, up to \pm 2.5 mm., the anthers often squarish and emarginate or occasionally ovate; the filaments are sometimes almost equal in length to the anthers and always bear conspicuous spreading sessile glands at the base, nearly equal to the anthers in length. The linear-lanceolate staminodia are usually hairy, and are \pm 0.8 mm. long. The gynaecium is 3 mm. or under in length, and is for the most part densely pubescent, although in some cases it may be glabrescent or even glabrous. The ovate or ellipsoid ovary is slightly longer than the stout style, which is topped by a conspicuous subcapitate stigma. The fruit, of which I have no material at hand, is presumably ellipsoid, up to 13 mm. long and 8 mm. broad, subtended by a simple-margined cupule that is slender and subpateriform, and one-third the length of the fruit.

Although the specimens from Mexico and Central America vary considerably from each other and from the type from Peru, there seems no reason for setting them up as a new species. Kostermans (Meded. Bot. Mus. Utrecht 25: 19. 1936) mentions the close relationship between *N. Laurcl*, *N. rigida*, and *N. reticulata*, giving the densely sericeous-hirsute inner surface of the tube of the latter as a diagnostic character. Many of the specimens cited above are intermediate in this as well as other characters. All gradations of leaf-base, shade of pubescence, and internal floral structure are apparent in the material at hand. Eventually further study of South American collections may reveal different trends and make another disposition of the North and Central American specimens advisable.

DOUTFUL SPECIES AND VARIETIES OF *NECTANDRA*

Nectandra mollis γ *venosa* Meissner in DC. Prodr. 15¹: 149. 1864.

This variety, described from Mexico, Central America, and South America, Mez reduces to *Nectandra reticulata* (Ruiz & Pavon) Mez. None of the syntypes are at hand for comparison; they include Oersted's collection from Costa Rica and Schiede & Deppe 243 from Mexico.

Nectandra mollis β *villosa* Meissner in DC. Prodr. 15¹: 148. 1864.

This also is reduced by Mez to *Nectandra reticulata* (Ruiz & Pavon) Mez. The syntypes, from Mexico (Schiede & Deppe 241, 1145) and South America, are unavailable at present.

Nectandra polita β ? Oerstedii Meissner in DC. Prodr. 15¹: 164. 1864.

The type, Oersted 12, from Nicaragua, has not been seen; Mez includes the variety under *Nectandra latifolia*.

Nectandra turbacensis γ *mexicana* Meissner in DC. Prodr. 15¹: 152. 1864.

Mez reduces this to *Nectandra rectinervia* Meissner. The syntypes, Linden 16 and Galeotti 7101, from Mexico, are not available.

Nectandra amazonum var. δ *Oerstedii* Meissner in DC. Prodr. 15¹: 150. 1864.

The syntypes presumably are the numbers cited by Mez, under *Nectandra globosa*, *Oersted 16, 17, 18*, from Costa Rica. So far, they have not been available for study.

SPECIES EXCLUDED FROM *NECTANDRA*

Nectandra chiapensis Lundell = *OCOTEA CHIAPENSIS* (Lundell) Standley & Steyermark.

Nectandra striata Nees = *MYRODIA* cf. *FUNEBRIS* L. (ex Gürke), fide Mez.

5. *Litsea* Lamarck

Litsea Lamarck, Dict. 3: 574. 1791; Hemsley, Biol. Centr. Am. Bot. 3: 76. 1882; Mez in Jahrb. Bot. Gart. Berlin 5: 474. 1889; Bartlett in Proc. Amer. Acad. 44: 597. 1909.

Tetranthera Jacquin, Hort. Schoenbr. 1: 59, t. 113. 1797; Meissner in DC. Prodr. 15¹: 177. 1864.

Malapoenna Kuntze, Rev. Gen. 2: 571. 1891.

DISTRIBUTION: In mountain-forests of Mexico and Central America.

Small trees or shrubs not more than 6 m. high, with leaves lanceolate to elliptic with all intermediate forms, not more than 13 and usually less than 10 cm. long, or leaves ovate to orbicular and not more than 7 cm. long. The diagnostic character, however, lies in the dioecious flowers borne in small axillary subumbellate clusters on peduncles of varying lengths, usually not more than 2 cm., surrounded by an involucre that is quickly deciduous at anthesis. The floral parts are extremely variable in this unstable group, but in the main there are six perianth-lobes, occasionally aborted to fewer, equal or subequal in length. The ♂ flower usually bears three or four series of fertile stamens, the two inner of which are biglandular. The anthers are four-celled and are all introrse, though very occasionally in the inner cycles the lower locules appear to be lateral. A small aborted ovary may occur or be absent entirely. The ♀ flower has three or four series of three each of staminodia, the first two of which are usually without glands. The third and fourth, if present, bear at the base of the filament two glands which are often stipitate. The ovary is well developed in the ♀ flower. The fruit is a more or less globular berry, seated on a small scarcely changed perianth-tube, or on one that is thickened and enlarged to form a cupule or disc, which is seated on the enlarged pedicel.

The genus *Litsea* in America presents a pattern different from that of other genera of this hemisphere. There are two morphologically distinct divisions: first the group consisting of three species with leaves ovate or ovate-lanceolate to orbicular-ovate, showing bases rounded or subcordate, found only in Coahuila, Nuevo Leon, and San Luis Potosí; second, embracing the remainder of the genus, the group with leaves elliptic, lanceolate, linear, or oblong and all variations thereof, their bases not subcordate nor rounded, occurring from Chihuahua and Sinaloa south and east throughout Mexico and Central America.

KEY TO THE SPECIES OF *LITSEA*

A. Leaf-bases rounded or subcordate.

- B. Young branchlets densely ferruginous-pubescent; lower surface of leaves tomentose; petioles pubescent; inflorescence densely ferruginous-pubescent; infructescence not more than 1.5 cm. long; fruit ± 5 mm. long. 1. *L. Muelleri*.
- B. Young branchlets glabrous or at most glabrescent; lower surface of leaves and petioles glabrous; inflorescence glabrous or glabrescent; infructescence not less than 1.5 cm. long; fruit 1 cm. or more long.
 - C. Leaf-blades ovate-lanceolate, the largest up to 7 cm. long, the apex acute. 2. *L. Pringlei*.
 - C. Leaf-blades ovate or orbicular-ovate, the largest up to 4 cm. long, the apex acute, obtuse, or rounded. 3. *L. parvifolia*.
- A. Leaf-bases not rounded or subcordate. 4. *L. glaucescens*.
 - B. Branchlets, petioles, and venation not conspicuously flavescent.
 - C. Leaf-blades usually oblong-elliptic or ovate-elliptic, glabrous to densely tomentose. 4a. *L. glaucescens* var. *subsolitaria*.
 - C. Leaf-blades linear or at most linear-lanceolate to oblong, always glabrous. 4b. *L. glaucescens* var. *Schaffneri*.
 - B. Branchlets, petioles, and venation conspicuously flavescent. 4c. *L. glaucescens* var. *flavescens*.

1. *Litsea Muelleri* Rehder in Jour. Arnold Arb. 16: 449. 1935.

Litsea Tharpiana Standley in Field Mus. Publ. Bot. 17: 247. 1937.

DISTRIBUTION: Mountains of Nuevo Leon, Mexico, at an altitude of 1500–2600 m.

MEXICO: Nuevo Leon: Sierra Madre Oriental, common in dense woods east side of divide, between San Francisco Canyon and Pablillo, 15 miles s.w. of Galeana, alt. 2600 m., May 14, 1934, C. H. & M. T. Mueller 379 (♂ fl., TYPE of *L. Muelleri*—A, Mich, NY, Tex, US); Hacienda Pablillo, Galeana, August 18, 1936, Taylor 188 (fr., type of *L. Tharpiana*, ♂ fl., Tex); cañon above Alamar, C. H. & H. T. Mueller 689 (fr., A, Mich, NY, Tex, US).

This species is easily separated from the other species of *Litsea* with rounded or subcordate leaf-bases by the occurrence of a dense persistent pubescence on the young branchlets and petioles and a tomentum on the lower surface of the leaf-blades. The nearest relatives are to be found in the *L. parvifolia* complex, from Nuevo Leon and Coahuila, but separated by the ferruginous (sometimes becoming fuscous) pubescence on the young branchlets, and by the venation of the lower leaf-surface. On the whole, the lateral nerves are more ascending in *L. Muelleri*, the petioles longer and densely hairy, and the leaf-bases less pronouncedly cordate. The two entities described undoubtedly represent the same species.

2. *Litsea Pringlei* Bartlett in Proc. Amer. Acad. 44: 598. 1909; Standley in Contr. U. S. Nat. Herb. 23: 287. 1922.

Litsea novoleontis Bartlett in op. cit. 601; Standley in op. cit. 288.

DISTRIBUTION: Ridges in the Sierra Madre near Monterrey, Nuevo Leon, and in southwestern San Luis Potosí.

MEXICO: Without locality, April, 1926, Runyon & Tharp 893, 1008 (sterile, fr., Tex). Nuevo Leon: Municipio de Villa Santiago, Cañon Marisio Arriba, Rancho Las Adjuntas, C. H. Mueller 2042 (fr., GH); Cañon Diente, near Monterrey, C. H. Mueller 2662 (fr., GH); Sierra Madre Oriental, waterway below Alamar, about 15 miles s.w. of Galeana, C. H. & M. T. Mueller 620 (fr., NY, Tex, US); near Monterrey, Pringle 2078 (fr., GH), 2837 (fr., type of *L. novoleontis*, GH); limestone ledges, Sierra Madre above Monterrey, alt. 800 m., March 8, 1906, Pringle 10238 (♂, ♀ fl., TYPE of *L. Pringlei*—GH, NY, US) (shrub 1.3–2 m.), Tharp 1835 (♀ fl., Tex, US). San Luis Potosí: Alvarez, Sept. 5–10, 1902, E. Palmer 62 (♂ fl., fr., GH, NY, US); mountains, San José Pass, August 5, 1890, Pringle 3146 (fr., NY, US).

NATIVE NAMES: "La Brel" (Nuevo Leon); "Laurel" (San Luis Potosí).

This shrub, 1.3–2 m. high, bears furcate branchlets which are densely or sparsely leafy and are reddish black or olivaceous in color. The coriaceous reticulate ovate-lanceolate leaf-blades are extremely variable in size, becoming as long as 7 cm., their tips often mucronulate, and their bases rounded to subcordate. The ♂ inflorescences are variable, which fact accounts for the description of the two species *L. Pringlei* and *L. novoleontis* from the same locality. In the former the 1–4 erectly pedunculate subumbellate ♂ inflorescences occur principally in the axils of terminal leaves, giving an appearance of dense flower-clusters. The ♂ inflorescences of the specimens described as *L. novoleontis* are single, axillary, and borne on slender nodding peduncles. The fruit is black, globose, about 11 mm. in diam., subtended by an expanded pedicel about 5 mm. long, and \pm 4 mm. in diam. The peduncle is only slightly enlarged.

3. *Litsea parvifolia* (Hemsley) Mez in Jahrb. Bot. Gart. Berlin 5: 481. 1889; Bartlett in Proc. Amer. Acad. 44: 601. 1909; Standley in Contr. U. S. Nat. Herb. 23: 288. 1922.

Umbellularia parvifolia Hemsley, Biol. Centr. Am. Bot. 3: 77. 1882.

Malapoenna parvifolia Kuntze, Rev. Gen. 2: 571. 1891.

Litsea pedicellata Bartlett in Proc. Amer. Acad. 44: 598. 1909; Standley in Contr. U. S. Nat. Herb. 23: 287. 1922.

DISTRIBUTION: Mountains near Saltillo, Coahuila, and Monterrey, Nuevo Leon.

MEXICO: Coahuila: Abundant in mountains near Saltillo, July 30, 1848, Gregg 314 (♀ fl., fr., ISOTYPE of *Umbellularia parvifolia*, GH) (shrub 1.5–3 m. tall); April 15–30, 1898, E. Palmer 68 (♂ fl., GH), alt. 2100 m., April 12, 1906, Pringle 10239 (♂ fl., type of *L. pedicellata*—GH, NY, US) (shrub 1.3–1.5 m.). Nuevo Leon: Monterrey, C. H. & M. T. Mueller 301 (♀ fl., fr., Tex.).

This is the earliest species of *Litsea* to be described from northern Mexico. The shrub, 1.3–3 m. in height, has ovate-lanceolate to orbicular leaf-blades, minutely mucronulate at the apex and rounded, subcordate or cordate at the base, more or less coriaceous, and heavily reticulate, not more than 4 (usually 3) cm. long. Characteristic is a bloom discernible on leaf-blade, stem, buds, and fruiting calyx, due to the presence of a thin film of minute, rapidly disappearing pubescence. The situation existing in *Litsea parvifolia* and *L. pedicellata* parallels that in *L. Pringlei* and *L. novoleontis*. The ♂ inflorescence of *L. parvifolia* is a single axillary subterminal umbel borne on slender more or less recurving peduncles. The flowers, 3 or 4 per umbel, are subtended by densely tomentose pedicels 2 mm. long. The ♂ inflorescences of *L. pedicellata* are more densely aggregated near the tips of the flowering branchlets, occurring in a few subumbellate axillary clusters and a heavily flowered terminal panicle up to 3 cm. long. There is a slender grace perceived in the branchlet of *L. pedicellata* that is wholly lacking in the more coarse and rather stiff aspect of *L. parvifolia*. The leaf-blades of the type of the former are less heavily coriaceous and of a bluish green, with reticulations more prominent. In spite of these differences, there seems to be no sound reason for keeping up both species.

4. *Litsea glaucescens* H.B.K. Nov. Gen. & Sp. 2: 133 [168]. 1817.

Small aromatic tree, the branchlets smooth, dark or reddish brown or olive, terete. Petioles slender, canaliculate, 5–20 mm. long, \pm 1 mm. in

diameter; leaf-blades variable, usually thinly coriaceous, sometimes membranaceous, olive-green to dark brown above when dried, glaucous to glaucous or at least paler beneath, usually elliptic-lanceolate or lanceolate, occasionally oblong or ovate-lanceolate, (4-) 7-9 (-12.5) cm. long and (1-) 2-3 (-3.5) cm. broad, attenuate to cuneate or obtuse at base, acute to acuminate or sometimes obtusish at apex, usually with a mucro of varying length, glabrous throughout or sometimes in young stages slightly pubescent above and more densely pubescent beneath, the venation yellowish or red-brown and except for the costa obscure above, the lateral veins usually ascending, slightly prominent beneath, occasionally with the marginal vein prominent, the entire surface frequently conspicuously areolate. ♂ inflorescences axillary, solitary or racémose umbels less than 2.5 cm. long, the peduncles 1 cm. or less in length, usually glabrous, the pedicels up to .5 cm. long and pubescent. Flowers 3-5 per umbel, often slightly pubescent, up to 4 mm. long: perianth-lobes 6, membranaceous, oblong or elliptic, usually 3 mm. long, the tube very short, the stamens 9. ♀ inflorescences axillary, solitary umbels up to 2 mm. long, the peduncles up to 1.5 cm. long; flowers 3-5 per umbel, 2-3 mm. long, often slightly pubescent, the perianth-lobes 6, membranaceous, usually elliptic, the tube very short, the staminodia usually 9. Fruit a globular berry up to 12 mm. in diameter, subtended by the enlarged usually glabrous tube and pedicel up to 7 mm. long, flaring at the tip to 2 mm. in breadth usually, sometimes the tube expanding to form a shallow cupule or disc up to 4 mm. in diameter.

DISTRIBUTION: Northwestern Mexico, south and east to Guatemala, Honduras, and Costa Rica. The species occurs in every state of Mexico except Sonora and Durango in the northwest, and Coahuila and Nuevo Leon in the north central area, in which latter states it is replaced by the ovate-orbicular-leaved species. Type-material of the species was collected by Humboldt & Bonpland along the shores near Acapulco and in the mountains about Jalapa at 1280 m. altitude. The species in the broad sense occurs generally at an altitude of between 2000 and 3000 m. in forested mountainous regions, although to the north, where it abounds in the plains and along the coast, it descends to a much lower altitude. It is locally used for seasoning or flavoring for meats, soups, and other foods, and as a substitute for tea; it is used also as a medicine for colic pains, etc.

This widespread species, as *Tetranthera glaucescens*, was split into four varieties by Meissner (1864), the separation being made principally on the type of inflorescence. Heinsley (1882) listed also a second species *Litsca Neesiana* with two varieties. Mez (1889) submerged *L. glaucescens* var. *subsolitaria* (Meissner) Hemsley into the species proper, and elevated var. *major* Meissner to specific rank as *L. guatemalensis*. Bartlett (1909) set apart the Costa Rican collections as *L. flavesiensis*, and those from San Luis Potosí and Tamaulipas (*L. glaucescens* var. *subsolitaria*) as *L. Schaffneri*, in which he included Parry & Palmer 798, cited by Hemsley under *L. glaucescens* var. *subcorymbosa*.

It seems impossible at present to formulate any clear-cut species in this highly variable group. Careful study of the available material shows a single complex species which varies with each type of locality in which it has been collected. The typical variety, var. *subsolitaria* (the oldest varietal name extant applied to the type-material), was originally collected in Guerrero and Vera Cruz. Subsequent scattered collections have been

recorded from nearly every state in Mexico, each showing slight variation from the variety. On the periphery of the range of the typical variety are two divergent groups of specimens which seem worthy of varietal rank. They may be easily recognized in most cases, but frequently specimens are found which show a gradation toward the typical variety. A treatment of the three varieties follows.

4a. *Litsea glaucescens* var. *subsolitaria* (Meissner) Hemsley, Biol. Centr. Am. Bot. 3: 76. 1882; Mez in Jahrb. Bot. Gart. Berlin 5: 477. 1889; Bartlett in Proc. Amer. Acad. 44: 599. 1909.

Litsea glaucescens H.B.K. Nov. Gen. & Sp. 2: 133 [168]. 1817; Mez in Jahrb. Bot. Gart. Berlin 5: 477. 1889; Bartlett in Proc. Amer. Acad. 44: 599. 1909.

Litsea Cervantesii H.B.K., op. cit. 134 [168].

Tetranthera glaucescens Sprengel, Syst. Veg. 2: 267. 1825.

Persea ? *Orizabae* Martens & Galeotti in Bull. Acad. Sci. Brux. 10²: 358. 1843; Meissner in DC. Prodr. 15¹: 56. 1864; Hemsley, Biol. Centr. Am. Bot. 3: 72. 1882.

Tetranthera villosa Martens & Galeotti in Bull. Acad. Sci. Brux. 10²: 359. 1843.

Tetranthera Neesiana Schauer in Linnaea 19: 712. 1847; Meissner in DC. Prodr. 15¹: 193. 1864.

Tetranthera glaucescens var. α *subsolitaria* Meissner in DC. Prodr. 15¹: 193. 1864, p.p.

Tetranthera glaucescens var. β *subcorymbosa* Meissner, l. c.

Tetranthera glaucescens var. γ *racemosa* Meissner, l. c.

Tetranthera glaucescens var. δ *major* Meissner, l. c.

Tetranthera Neesiana var. β *corymbifera* Meissner, l. c.

Tetranthera Neesiana var. γ *villosa* Meissner, l. c.

Litsea glaucescens var. β *subcorymbosa* Hemsley, Biol. Centr. Am. Bot. 3: 76. 1882.

Litsea glaucescens var. γ *racemosa* Hemsley, l. c.

Litsea Neesiana Hemsley, l. c.; Mez in Jahrb. Bot. Gart. Berlin 5: 477. 1889; Bartlett in Proc. Amer. Acad. 44: 599. 1909; Standley in Contr. U. S. Nat. Herb. 23: 287. 1922.

Litsea Neesiana var. β *corymbifera* Hemsley, l. c.

Litsea Neesiana var. γ *villosa* Hemsley, l. c.

Litsea Orizabae Mez in Jahrb. Bot. Gart. Berlin 5: 479. 1889; Bartlett in Proc. Amer. Acad. 44: 599. 1909; Contr. U. S. Nat. Herb. 23: 287. 1922.

Litsea guatemalensis Mez in Jahrb. Bot. Gart. Berlin 5: 479. 1889; Bartlett in Proc. Amer. Acad. 44: 599. 1909.

Malapoenna glaucescens Kuntze, Rev. Gen. 2: 571. 1891.

Malapoenna guatemalensis Kuntze, l. c.

Malapoenna Neesiana Kuntze, l. c.

Malapoenna Orizabae Kuntze, l. c.

Litsea acuminatissima Lundell in Contr. Univ. Mich. Herb. 4: 3. 1940.

Litsea Matudai Lundell, op. cit. 5.

MEXICO: Without locality, *Humboldt & Bonpland* s.n. (δ fl., type of *Litsea Cervantesii* not seen), *Aschenborn* 349 (fl., type of *Tetranthera Neesiana* not seen), *Haenke* [1539] (φ fl., NY). Chihuahua: Sierra Canelo, Río Mayo, *Gentry* 2539 (fr., A). Sinaloa: Culiacán, August 27-Sept. 15, 1891, *E. Palmer* 2770 (sterile, GH, US), *Montez & Salazar* 1688 (sterile, US); Cerro del Viejo, San Ignacio, *Montez & Salazar* 82 (δ fl., US). Zacatecas: Plateado, *Rose* 3650 (φ fl., US). Nayarit (Tepic): In the Sierra Madre, near Santa Teresa, *Rose* 3437 (sterile, US). Jalisco: Bolaños, *Rose* 3746 (fr., US). Hidalgo: El Chico, *Lyonnet* 727 (fr., A, NY, US); Real del Monte, March 22, 1849, *Gregg* 639 (δ fl., ISOSYNTYPE of *Tetranthera glaucescens* α *subsolitaria*, GH) (shrub; [fl.] yellowish); on Sierra de Pachuca, *Rose & Hay* 5566 (fr., US). Vera Cruz: La Joya, Perote, *Balls* 5520 (φ fl., fr., A); near Jalapa, *Pringle* 8156 (δ fl., GH, NY, US), *Schiede & Deppe* s.n. (δ fl., GH, NY); on eastern slopes of mountains near Jalapa, 1280 m. alt., *Humboldt & Bonpland* s.n. (φ fl.,

SYNTYPE of *Litsea glaucescens* not seen); Mirador, *Liebm* (*Lauraceae* 60) (♂ fl., US), August 1841, *Liebm* s.n. (♂ fl., US), *Mohr* s.n. (♂ fl., US); San Cristóbal, Orisada [Orizaba], *Mohr* [434] (♂ fl., US); Orizaba, *Balls* 4320 (♂ fl., A), *Bilimik* 359 (♂ fl., GH, US), *Botteri* 7 (♂ fl., GH, US), 108, 183 (fr., GH, US), 549 (♂ fl., GH), *Bourgeau* 3128 (fr., GH), *Galeotti* 252 (fl., type of *Persea*? *Orizabae* not seen), *Liebm* (*Lauraceae* 65) (♂ fl., cited by Mez under *Litsea Orizabae*, fragm., US), *Matuda* 591 (sterile, A), *F. Mueller* 308, 1307 (♂ fl., NY); *Maltrata*, May 6, 1937, *Matuda* 1211 (fr., A, type of *Litsea acuminatissima*—Mich); various localities, *Schiede* 58 (fr., NY). Puebla: *Chiautla*, alt. 2100–2400 m., May 1841, *Liebm* s.n. (sterile, GH, US). Mexico: Temascaltepec, *Pineda*, *Hinton* 3188 (♀ fl., NY, US); Las Cruces, *Hinton* 3257 (♂ fl., A, US), 7223 (♀ fl., GH), Salitre-Canitas, *Hinton* 3940 (fr., A). Michoacán: Sierra Torricillas, Coalcomán, *Hinton* 12365 (♂, GH), 12800 (♂, GH), 15746 (♂, US). Guerrero: On shores near Acapulco, *Humboldt* & *Bonpland* s.n. (♀ fl., SYNTYPE of *Litsea glaucescens* not seen); Piedra Ancha-Tres Cruces, *Galeana*, *Hinton* 15418 (♀ fl., GH). Oaxaca: Without locality, *Cuming* (♂ fl., isotype of *Tetranthera glaucescens* γ *racemosa*, NY); *Talea*, alt. 900 m., Feb. 184—, *Galeotti* 257 (♂ fl., GH [as 2977], US) (fl. white-rose), alt. 1800 m., Oct. 184—, *Galeotti* 258 (♀ fl., US) (fl. white); *Villa Alta*, *Schltes* 637 (sterile, NY); Sierra de San Felipe, in forests and on small wooded plateaus in the mountains, alt. 2700–2900 m., on lime-ridges of *Sola*, alt. 2400–2600 m., and in the vicinity of *Yavesia* and *Capulapán*, alt. 2100–2600 m., *Galeotti* 251 (fl., type of *Tetranthera villosa* not seen); Sierra de San Felipe, *Pringle* 5679 (♂ fl., GH), *Conzatti* & *Gonzales* 1120 (♀ fl., GH, US); mountains southeast of *Miahuatlán*, alt. 3050 m., *Nelson* 2531 (♀ fl., GH, US); *Cafetal* San Rafael (Cerro Espino), *Reko* 3562 (♂ fl., US). Chiapas: Between *Huitzán* and *Oxchuc*, *C. & E. Seler* 2149 (♂ fl., GH, NY, US); *Saxchanal*, Sierra Madre, *Matuda* 4284 (♂ fl., A, NY, US); *Comitán*, *Goldman* 818 (♂ fl., US); between *San Cristóbal*, *Las Casas*, and *Huitzán*, *C. & E. Seler* 2137 (♂ fl., GH); west side of *Volcán* de *Tacaná*, alt. 2800 m., March 30, 1939, *Matuda* 2933 (♀ fl., fr., isotype of *Litsea Matudai*, A, GH, NY). GUATEMALA: Petén: San Pedro L[ake], *Texada* 54 (♂ fl., US). Quiché: San Miguel Uspantán, *Heyde* & *Lux* 3466 (♀ fl., US). Baja Verapaz: Montaña de San Ysidro-San Jerónimo, *Salas* 491 (fr., US); dry, rocky hills n. of *Santa Rosa*, *Standley* 69694 (sterile, NY). Huehuetenango: Sierra de los Cuchumatanes, above *Chiantla*, *Standley* 65630 (♀, NY). San Marcos: Above Río *Tacaná*, near *San Antonio*, *Standley* 66089 (sterile, A). Quezaltenango: Cerro Quemado, *Kellerman* 5927 (♂ fl., US), 5935 (♂ fl., US); Cerro La Pedrera, south of Quezaltenango, *Standley* 66450 (♂ fl., A, NY); slopes of *Volcán* de *Santa María*, above *Palojunoj*, *Standley* 67526 (♀ fl., A). Guatemala: *Volcán* de *Pacaya*, above *Las Calderas*, *Standley* 58448 (♀ fl., A). Sacatepéquez: Near *San Juan*, *Hartweg* 613 (♂ fl., isotype of *Tetranthera glaucescens* δ *major*, US); *San Rafael*, *J. D. Smith* 1276 (♂ fl., GH, US); slopes of *Volcán* de *Agua*, south of *Santa María* de *Jesús*, *Standley* 59447 (♂ fl., A, NY), *Volcán* de *Agua*, *Kellerman* 4953 (♂, US), *Maxon* & *Hay* 3753 (♂, US); *Santa María* de *la Antigua*, *Pittier* 13 (♂, US); hills of *Finca Carmona*, s.e. of *Antigua*, *Standley* 63668 (sterile, US). Chimaltenango: Cerro de Tecpám, region of *Santa Elena*, *Standley* 58756 (♂, NY, US); Barranco de la Sierra, s.e. of *Patzúm*, *Standley* 61605 (♂, A, NY); Chichavac, *Skutch* 253 (♂, US), *Salas* 581 (♂, US). EL SALVADOR: Chalatenango: *La Reina*, *S. Calderón* 2456 (♂, NY, US). San Salvador: Cultivated in *Santa Tecla*, *S. Calderón* 1489 (♀, GH, NY, US). HONDURAS: Comayagua: Near *El Achote*, hills above plains of *Siguatepeque*, *Yuncker*, *Dawson* & *Youse* 6370 (♂, GH).

NATIVE NAMES: "Laurel" (Vera Cruz, Mexico, Michoacán, Guerrero, Oaxaca, Chiapas, Baja Verapaz, Chimaltenango, Quezaltenango); "Laurill" (Zacatecas, Nayarit [Tepic], Jalisco); "Laurillo" (Michoacán); "Laurel de la Sierra" (Sinaloa); "Ziz-uch" (Chiapas); "Laurel aromatico" (Petén); "Laurel de especie" (El Salvador).

The specimen from Chihuahua occurs in the transition pine-oak country and, at first glance, seems to be at variance with the typical variety as we

are most familiar with it. The leaf-blades are densely pubescent beneath, slightly smaller, acutish rather than acuminate, and oblongish lanceolate rather than elliptic. Otherwise, the number is similar to the other specimens found in the northern Mexican states.

The collections made in Sinaloa, Zacatecas, Nayarit, Jalisco, and Mexico are similar to those found in Hidalgo, and show a tendency toward specimens of the varietal segregate *Schaffneri* as found in Tamaulipas.

In Vera Cruz we find the typical variety in its truest sense. The lanceolate-elliptic acuminate leaf-blades measure 9.5×2.5 –3 cm. and are abundant on the branchlets, bearing in their axils numerous short-pedunculate inflorescences, simple or branched. The original description of *Persea Orizabae*, from this region, is sketchy. Mez enlarges this to indicate a tree with large leaf-blades, comparatively speaking (7.5–3.5 cm.), ovate to lanceolate, albescent or softly cinereous-long-tomentose beneath. Except for the pubescence, which has been found to be extremely variable in this group, the fragment matches perfectly any number of specimens of typical *L. glaucescens* from Vera Cruz and Oaxaca.

The sterile Liebmam sheet from Puebla, not far from Orizaba, Vera Cruz, shows leaf-blades that are certainly broader than is usual with *L. glaucescens*. There can be no doubt that the sheet is lauraceous and probably a variant of this species. After one hundred years in an herbarium, the bark still has the characteristically pungent odor typical of many Lauraceae.

The specimens collected by Hinton in Michoacán have leaf-blades that are slightly broader in proportion to their length, and the veins are rather more arcuate than is the case of the majority of leaf-blades found on typical specimens. It is unfortunate that material from one of the type-localities of the typical variety is so scanty. The Hinton plant is not typical, for it possesses the largest-known leaf-blades of the genus in America (13 \times 3.5 cm.). There is no doubt, however, that in spite of their oversize, the sheet belongs here. The Oaxacan material was collected very near the type-locality of the species and is similar to specimens found there. The material from Chiapas also ties up with that from Oaxaca and Vera Cruz. The elliptic or lanceolate-elliptic leaf-blades of the specimens are very conspicuously reticulate and shining. The branchlets are densely leafy and the inflorescences are very full-flowered.

The Guatemalan specimens differ from typical *L. glaucescens* in consistently having on the lower surface of the leaves a pubescence of varying density, sometimes early exhibiting a thick tomentum which later may be reduced to a few strigose hairs persisting about the costa and veins. The young branchlets also are pubescent in varying degrees, as are the petioles, peduncles, and pedicels. The leaves tend for the most part to be more elliptic than lanceolate. Again these specimens must be included in the species in the broad sense and not maintained as a separate species.

Schauer's description of the leaf-blades of *T. Neesiana* mentions the shining upper surface scattered with stellulate-pilose dots, a characteristic not

found in the Lauraceae. The remainder of the description is typical of the genus, so probably the type of pubescence was erroneously reported.

4b. *Litsea glaucescens* var. *Schaffneri* (Bartlett), comb. nov.

Tetranthera glaucescens var. α *subsolitaria* Meissner in DC. Prodr. 15¹: 193. 1864, p.p.
Litsea Schaffneri Bartlett in Proc. Amer. Acad. 44: 600. 1909; Standley in Contr.
 U. S. Nat. Herb. 23: 288. 1922.

Litsea pallens Lundell in Contr. Univ. Mich. Herb. 4: 5. 1940.

DISTRIBUTION: Mountains of San Luis Potosí, Guanajuato, and Tamaulipas.

MEXICO: Tamaulipas: Cerro los Armadillos, vicinity of San José, Bartlett 10389 (fr., GH, US); in shady gorges before arriving at Palmilla from Victoria to Tula, Nov. 1830, Berlandier 2185 (=765) (isosyntype of *Tetranthera glaucescens* var. α *subsolitaria*, GH, NY); vicinity of Victoria, alt. 320 m., Feb. 1–April 9, 1907, E. Palmer 208 (fr., GH, US), Runyon 1008 (♀ fl., US); San Leucas, Viereck 44, 585 (♂ fl., fr., US); Sierra near Victoria, alt. 1200 m., Feb. 1932, von Rozynski 341 (♂ fl., isotype of *L. pallens*, NY, US). San Luis Potosí: Near Santa Barbara, Hartweg 382 (♂ fl., US); near San Luis Potosí, Sept. 12–16, 1902, E. Palmer 453 (♀ fl., A, US), May 24, 1905, E. Palmer 647 (fr., GH, US), Parry & Palmer 798 (♀ fl., fr., GH, NY, US); in mountains, San Miguelito, Sept. 1876, Schaffner 23 (♂ fl., TYPE of *L. Schaffneri*, GH), 431, 463 (♂ fl., NY, US), 710 (♀ fl., ♂ fl., fr., GH). Guanajuato: Santa Rosa, Dugès 231 (♂ fl., US), 1000 (♂ fl., GH).

NATIVE NAMES: "Laurel," "Sacred Laurel" (San Luis Potosí).

This aggregate is one of the extreme variants from the norm of *Litsea glaucescens*. The shrub bears slender foliose ochraceous branchlets, with narrowly lanceolate mucronulate leaves, acute at both ends, more or less coriaceous, glabrous and glaucous beneath, the venation inconspicuous except for the prominent midrib and reticulation. The leaf-blades vary in size, being 2–6 cm. \times 5–12 mm. The inflorescences are usually solitary pedunculate umbels located in the axils of the leaves of terminal or lateral branchlets. The rather large globose and black fruits are about 12 mm. in diameter.

The specimens from Tamaulipas differ from those from the type-locality in their larger more acuminate leaf-blades, not glaucous but concolorous, with more prominent venation. Lundell notes the similarity between *L. pallens* and *L. Schaffneri*.

4c. *Litsea glaucescens* var. *flavescens* (Bartlett), comb. nov.

Litsea flavescens Bartlett in Proc. Amer. Acad. 44: 599. 1909; Standley in Field Mus. Publ. Bot. 18: 451. 1937.

DISTRIBUTION: Mountainous regions of Costa Rica, at an altitude of 1500–1900 m.

COSTA RICA: San José: Hills above Belmira, near Santa María de Dota, alt. 1600 m., Jan. 1898, Tonduz 7352 (Herb. Nat. Costa Rica 11638) (♂, ♀ fl., TYPE of *L. flavescens*—GH, NY, US), Standley 42525 (♂ fl., US); Cuesta de Tarrazú, Tonduz 7796 (♂ fl., US); in mountains of Candelaria, Oersted 10 (♂ fl., US).

NATIVE NAME: "Lentisco."

This Costa Rican segregate is distinguished by the striking flavescent venation, particularly the prominent marginal vein, and the yellowish petiole apparent in the dried specimens, as well as the lack of glaucosity on the lower leaf-surface. Bartlett also mentions the smaller flowers and the tomentose pedicels as presenting specific differences. Both of these characters seem of too variable a nature to be criteria of specific importance.

Pubescence may be found on many specimens of the typical variety; and some of the Chiapas material shows a similarity of foliage-characters. Since no specimens have been collected as yet in the intervening areas, the entity is maintained for the present as a regional variety of *L. glaucescens*.

6. *Beilschmiedia* Nees

Beilschmiedia Nees in Wallich, Pl. As. Rar. 2: 61, 69. 1831, Syst. Laurin. 21, 192, 197. 1836; Meissner in DC. Prodr. 15¹: 62. 1864; Kostermans in Rec. Trav. Bot. Néerl. 35: 847. 1938 (Meded. Bot. Mus. Utrecht 48: 847. 1938).

Hufelandia Nees, Pl. Laurin. Expos. 11 (n.9), 21. 1833, Syst. Laurin. 187, 674. 1836; Meissner in DC. Prodr. 15¹: 65. 1864.

DISTRIBUTION: Tropical regions of both hemispheres.

KEY TO THE SPECIES OF BEILSCHMIEDIA

A. Leaf-blades on both surfaces prominently and loosely and often incompletely reticulate.

B. Leaf-blades elliptic, not less than 7 cm. in width, glaucous beneath; fruits to 15 cm. in length.....1. *B. Anay*.

B. Leaf-blades elliptic or lanceolate-elliptic, not exceeding 4-5 cm. in width, not glaucous beneath; fruits not more than 4 cm. long.

C. Branchlets and leaf-blades glabrous; leaf-blades long-acuminate, shining; venation loosely reticulate.

D. Branchlets gray, becoming red-brown or maculate, not corky; leaf-blades chartaceous, sharply caudate-acuminate, not pronouncedly undulate; fruit not constricted at base, not more than 3 cm. long.....2. *B. hondurensis*.

D. Branchlets gray, corky; leaf-blades coriaceous, obtusely acuminate, prominently undulate; fruit slightly constricted at base, up to 4 cm. long.....3. *B. Brenesii*.

C. Branchlets and leaf-blades yellowish brown-pubescent; leaves acutish to obtuse; venation incompletely reticulate.....4. *B. costaricensis*.

A. Leaf-blades on both surfaces prominently and completely reticulate, or the upper surface plane and the lower areolate.

B. Leaf-blades concolorous, at least not glaucous beneath, glabrous; inflorescence few-flowered, subglabrous.

C. Upper surface of leaf-blades completely and conspicuously reticulate.....5. *B. mexicana*.

C. Upper surface of leaf-blades plane6. *B. Steyermarkii*.

B. Leaf-blades glaucous beneath, glabrescent at maturity; inflorescence densely flowered, tomentose-pilosulose.

C. Branchlets cinereous-puberulous; leaf-blades above sparsely and beneath more densely pilosulose with loose whitish hairs.....7. *B. ovalis*.

C. Branchlets ferruginous-tomentose; leaf-blades glabrous above, except for lower portion of midrib, and beneath pubescent along veins.....8. *B. Austin-Smithii*.

1. *Beilschmiedia Anay* (Blake) Kostermans in Rec. Trav. Bot. Néerl. 35: 847. 1938 (Meded. Bot. Mus. Utrecht 48: 847. 1938).

Hufelandia Anay Blake in Jour. Wash. Acad. Sci. 9: 459, fig. 1. 1919.

DISTRIBUTION: From the forests of Central America, at an altitude of less than 300 m., to Colombia (according to Kostermans), at increasingly higher altitudes (2000 m.).

GUATEMALA: Alta Verapaz: Finca Chamá, *Popenoe* 884 (fr., US), *H. Johnson* 170 (fl., Ch, US). Suchitepéquez: In loamy soil of tropical forest at Finca Compromiso, Mazatenango, alt. about 365 m., Jan. 17, 1917, *Popenoe* 754 (fl., fr., TYPE of *Hufelandia Anay*, US). Escuintla: Río Guacalate, *Standley* 60223 (fl., Ch).

NATIVE NAMES: "Anay" (Guatemala); "Laurel canjime" (Colombia, fide Kostermans).

This tree bears fruit of good flavor, similar to that of an avocado, but not oily, according to the collector.

2. *Beilschmiedia hondurensis* Kostermans in Rec. Trav. Bot. Néerl. 35: 854. 1938
(Meded. Bot. Mus. Utrecht 48: 854. 1938).

DISTRIBUTION: At high altitudes in the interior of British Honduras.

BRITISH HONDURAS: Toledo: Temash River, *Kinloch 9a* (Y 35111) (sterile, Y); Camp 31, British Honduras-Guatemala Survey, alt. 630 m., April 7, 1934, *Schipp 1262* (fr., ISOTYPE, Ch, GH, NY) (small tree-like shrub, quite common in the interior at high altitudes; 7.5 m. high, 7.5 cm. diam.; fruit black).

This shrub, quite common according to the original collector, is represented at present only by a sterile specimen and the type, which is a fruiting branch from which most of the leaves and fruits have fallen on drying. The chartaceous, lanceolate to elliptic, long-acuminate leaf-blades, acutish at the base and prominently reticulate on both surfaces, measure up to 13.5 cm. in length and 4 cm. in width. The round canaliculate petiole is 5 (-9) mm. long. The short infructescences, up to 4 (-7.5) cm. long, bear somewhat enlarged peduncles about 5-6 mm. long and nearly 3 mm. thick, are a lightish rust-brown, rugulose in contrast to the smooth deeper red-brown young branchlets and the pale gray branches. The green or black (according to Schipp) smooth ellipsoid fruit attains a length of 3 cm. and a width of 1.5 cm.

3. *Beilschmiedia Brenesii*, sp. nov.

Arbor . . . , ramulis griseis suberosis lucidis mox opacis, apicibus fuscobrunneis. Folia opposita (?), petiolis glabris verruculosis brunneis canaliculatis, 3-10 mm. longis, laminis glabris coriaceis supra lucidis, ellipticis, ad 8 cm. longis et 3.5 cm. latis, basi cuneatis, apice obtuse plus minusve abrupte acuminati, margine recurvatis et laxe undulatis, penninerviis, costa supra tenuiter subtus crasse elevata, nervis 8-paribus supra et subtus delicate leviterque elevatis, rete venularum laxo supra conspicue subtus conspicuissime prominulo. Inflorescentia ignota. Infructescientia robusta, brevis, ad 7 cm. longa, pedunculis crassis et lignosis ramulis similibus aequalibusque, fructibus duobus tantum maturantibus. Fructus in sicco niger, lucidus, glaber, ellipsoideus, ad 4 × 2 cm., apice rotundatus, basi leviter constrictus, pedicello incrassato glabro, ad 10 mm. longo et 4 mm. lato.

DISTRIBUTION: Known only from the type-locality.

COSTA RICA: Alajuela: La Palma and El Socorro de San Ramón, July 24, 1928, *Brenes 6214* (fr., TYPE, Ch).

The new species is like none other from this hemisphere, but resembles very strikingly species of the genus found in eastern Asia. The nearest relative here is *B. hondurensis*, easily separated by the less rigidly coriaceous leaf-blades usually with sharply caudate-acuminate tips, the branchlets showing no corky tendency, and the much smaller fruit.

4. *Beilschmiedia costaricensis* (Mez & Pittier), comb. nov.

Hufelandia costaricensis Mez & Pittier ex Mez in Bull. Herb. Boiss. II, 3: 228. 1903
(excl. Pittier 1863, 1873, fide Kosterm.); Standley in Contr. U. S. Nat. Herb. 23: 292. 1922, in Field Mus. Publ. Bot. 18: 451. 1937.

DISTRIBUTION: Forests of Costa Rica, at an altitude of about 1800 m.

COSTA RICA: Alajuela: San Francisco and San Pedro de San Ramón, *Brenes 6605* (fl., Ch); La Peña de Zarcero, *A. Smith H. 592* (fl., Ch). San José: near Quebradillas, about 7 km. north of Santa María de Dota, *Standley 42865* (sterile, US); vicinity of El General, *Skutch 4389* (fr., A, Ch); San Isidro del General, *Stork 3121* (fr., Ch); forests of El Copey, alt. 1800 m., Feb. 1898, *Tonduz 11713* (fl., ISOSYNTYPE of *H. costaricensis*, US). Cartago: Hills near Navarro Valley, *Stork 1713* (fl., fr., Ch).

NATIVE NAME: "Quizarrá" (Costa Rica).

Kostermans separates the syntypes of *Hufelandia costaricensis* and places *Pittier 1863* under *B. Anay*. He associates *Tonduz 11713* with *B. mexicana*. From the material at hand it appears that the latter syntype of *H. costaricensis* differs from the sheets of *B. mexicana* in its larger leaf-blades, which are less variable in size, and present a more coarse and very prominent reticulation. The usual type of reticulation found in the family is a dense net-work of veinlets with seemingly no free "terminals" visible beneath the microscope in the dried state. The leaves of *B. costaricensis* show the veinlets with prominent free ends or terminals apparently forming an incomplete reticulum, whereas those of *B. mexicana* follow the usual pattern of complete reticulation. The inflorescences of the former are longer, rather more densely flowered, and somewhat pubescent as opposed to the few-flowered, glabrous inflorescences of *B. mexicana*. The flowers of *B. costaricensis* are slightly larger and possess longer tubes; they are pilose and bear staminodia that are long-acuminate. The flowers of *B. mexicana* are almost glabrous, with acute or abruptly acuminate staminodia. The fruit of *Beilschmiedia costaricensis* is ellipsoid, whereas that of *B. mexicana* is constricted at the base, a character which may eventually prove to be a variation due to age.

I have not seen *Pittier 1863*, a syntype of *H. costaricensis*, the number about which Kostermans is uncertain, although he places it under *B. Anay*. From the original description by Mez and Pittier, one may note differences between their species and *B. Anay*. For example, the leaf-blades of *H. costaricensis* are glabrous, concolorous, and in the dried state customarily fuscous-brown, whereas those of *B. Anay* are glabrous except for a sordid puberulence along costa and lateral veins, and are green above and glaucous beneath. The flowers of *B. Anay* are larger than those of *Hufelandia costaricensis* and the staminodia are triangular-acuminate and short-stipitate as opposed to the cordate, very long-acuminate staminodia of the latter. The ovary of *H. costaricensis* is ovoid, developing into a perfectly ellipsoid fruit, scarcely constricted toward the base and attaining a size of 3 cm. \times 1.2 cm. The subglobose ovary of *B. Anay* becomes an ellipsoid, pyriform, glossy-skinned fruit about 15 cm. long and similar in aspect to the avocado pear (*Persea americana*). The differences in leaf and flower may very possibly be variations within the species. The discrepancy in size and shape of fruit may be due to the stage of development at which the specimen was collected. Presumably, Kostermans was of this opinion when he combined the two under *B. Anay*.

5. *Beilschmiedia mexicana* (Mez) Kostermans in Rec. Trav. Bot. Néerl. 35: 846. 1938
(Meded. Bot. Mus. Utrecht 48: 846. 1938).

Hufelandia mexicana Mez in Jahrb. Bot. Gart. Berlin 5: 20. 1889.

DISTRIBUTION: Mexico, and south to Colombia according to Kostermans.

MEXICO: Vera Cruz: Cosalapa, *Purpus* 8745 (fl., US); Mirador, *Liebmamn* 711 (Lauraceae 16), Totula, *Liebmamn* 713 (Lauraceae 18) (fr., ISOSYNTYPES, US); Orizaba, *F. Mueller* 1460 (fr., SYNTYPE of *H. mexicana* not seen). Mexico: Dos Puentes, *Liebmamn* 712 (Lauraceae 20) (sterile, ISOSYNTYPE, US), *Liebmamn* (Lauraceae 17, 19, 21) (SYNTYPES not seen).

This rather small-leaved tree, according to Kostermans, occurs in Mexico, Costa Rica, and Colombia. He places *H. costaricensis*, as exemplified by *Tonduz* 11713, in this species. I have not seen the syntype from Orizaba, nor have I seen any Costa Rican or Colombian specimens which are a match for the Mexican material cited by Mez in his original publication. In the main, the glabrous branchlets, the small, typically minutely reticulate leaf-blades of varying size, the glabrous inflorescences shorter than the leaves, and the ellipsoid fruit set this species apart. For a discussion of the relationship with *H. costaricensis*, which was reduced by Kostermans, see the latter species.

6. *Beilschmiedia Steyermarkii*, sp. nov.

Arbor 18–24 m. alta, ramulis brunneis, subferrugineo-pubescentibus mox glabrescentibus, leviter sulcatis. Folia alternata, supra glabra, subtus sparse pubescentia costis exceptis. petiolis brunneis paulo crassis glabrescentibus leviter canaliculatis, ad 1.5 cm. longis et 2 mm. latis, laminis coriaceis, in siccō supra flavo-brunnescentibus subtus olivaceis, fide coll., supra viridibus subtus caeruleo-griseo-viridibus. ellipticis, ad 10 cm. longis et 3.7 cm. latis, basi cuneatis vel obliquis, apice rotundatis, penninerviis, costa subtus conspicua haud elevata, nervis lateralibus ad 7-paribus supra impressis plus minusve obscuris, subtus leviter elevatis angulo 45° divergentibus. subtus minute et inconspicue areolatis. Inflorescentia axillaris et sub-terminalis, paniculata, ad 8 cm. longa, leviter et sparse ferrugineo-tomentosa, mox glabrescens(?), pauci flora, pedunculata. Flores ad 3 mm. longi, pedicellis ad 2 mm. longis gracilibus, pubescentibus, perianthio campanulato flavo-viridescente, lobis ovatis nonnihil crassis pubescentibus, ad \pm 1.7 mm. longis; staminibus ser. I & II \pm 1.5 mm. longis antheris ovatis truncatis quam filamentis duplo longioribus, connectivo papilloso $\frac{1}{3}$ auctis antherae longitudine, ser. III oblongis truncatis minute biglandulosis; staminodiis \pm 1 mm. longis late ovatis abrupte acuminatis subcordatis stipitatis, stipite pubescente; gynoecio glabro ad \pm 1.7 mm. longo, ovario ovoides quam stylo longiore, stigmate inconspicuo parvo. Fructus ignotus.

DISTRIBUTION: Known only from type-locality.

GUATEMALA: Alta Verapaz: South of Cubilgütz, alt. 300–400 m., March 4, 1942, *Steyermark* 44494 (fl., TYPE, Ch) (tree 18–24 m.; leaves deep green above, blue-gray-green beneath; calyx yellow-green).

This single Guatemalan specimen described above is characterized by glabrescent elliptic coriaceous leaf-blades that are yellow-brown on drying, and by few-flowered sparsely pubescent inflorescences up to 8 cm. long. The lack of reticulation on the upper leaf-surface sets the species apart from other members of the genus.

7. *Beilschmiedia ovalis* (Blake), comb. nov.

Hufelandia ovalis Blake in Jour. Wash. Acad. Sci. 9: 461. 1919; Standley in Field Mus. Publ. Bot. 18: 451. 1937.

DISTRIBUTION: Costa Rica, known only from the type-locality.

COSTA RICA: Alajuela: Volcán de Poás, alt. 2300 m., March, *Pittier 2040* (fr., TYPE of *H. ovalis* not seen).

Kostermans has reduced Blake's species to synonymy under *B. sulcata*. Kostermans did not see any flowers of the type of *Laurus sulcata* R. & P. but he found no difference between the sterile specimen and other Peruvian and Colombian material cited by him (Kostermans in Rec. Trav. Bot. Néerl. 35: 850. 1938 [Meded. Bot. Mus. Utrecht 48: 850. 1938]). He explains the drawing of the type in Ruiz & Pavon, Laurographie, t. 356, showing 4-celled anthers, by bringing forward the possibility of the presence of cells in the ablasic part of the connective. Kostermans' conclusions may very possibly be correct, but it is difficult to accept them without more widely collected material than is available at present.

8. *Beilschmiedia Austin-Smithii* (Standley), comb. nov.

Persea Austin-Smithii Standley in Field Mus. Publ. Bot. 18: 1552. 1938.

DISTRIBUTION: Known only from the type-locality.

COSTA RICA: Alajuela: Palmira, Alfaro Ruiz, in a little swale at the edge of the forest, in a sunny position with eastern exposure, growing on clay-loam, April 30, 1937, *A. Smith 4168* (fl., TYPE, Ch) (a rare but notable tree 9 m. high, with same expanse, the bark obscurely gray, thick and corky; base of trunk 2 m. in diam., the main trunk broken off, with 2 laterals 20 cm. in diam.; bud-cluster yellowish; open flowers dull yellow-brown; leaves moderately lustrous on the upper surface).

This species is unusual at once for its densely foliose branchlets with very short internodes and its rounded, ovate or suborbicular, very small leaf-blades, not more than 7 cm. long (almost the smallest to be found in the genus), the upper surface of which is not reticulate. The long-pedunculate, many-flowered, loosely sordidly tomentose panicles are shortly branched and equal the leaves. The flower-structure is typically that of *Beilschmiedia*, with the nine fertile anthers two-celled, and with a well developed connective, particularly on the anthers of the third series. The large subcordate staminodia and the characteristic gynoecium mark the species as belonging to this genus. A sterile specimen in the Yale School of Forestry Herbarium bearing the collector's number 3, and the note that it was collected on Holstein Farm, Costa Rica, and sent presumably from the United Fruit Co., Sept. 9, 1938, may belong to this species.

7. *Aiouea* Aublet

Aiouea Aublet, Pl. Guian. 1: 310, 3: t. 120. 1775; Nees, Syst. Laurin. 362. 1836; Meissner in DC. Prodr. 151: 82. 1864; Mez in Jahrb. Bot. Gart. Berlin 5: 28. 1889; Kostermans in Meded. Bot. Mus. Utrecht 46: 37. 1938 (Rec. Trav. Bot. Néerl. 35: 37. 1938).

DISTRIBUTION: Mostly in South America, with one species in the West Indies and two in Central America.

KEYS TO THE SPECIES OF AIOUEA

A. Largest leaf-blades usually not more than 12 (-13) cm. long and 6 cm. broad; apex obtuse or rounded (only very occasionally obtusely and shortly acuminate); reticulation very conspicuous beneath..... 1. *A. costaricensis*.

A. Largest leaf-blades up to 16 (-18) cm. long and 7.5 cm. broad; apex obtusely and shortly acuminate; reticulation only slightly prominent beneath... 2. *A. Lundelliana*.

1. *Aiouea costaricensis* (Mez) Kostermans in Meded. Bot. Mus. Utrecht 46: 73. 1938
(Rec. Trav. Bot. Néerl. 35: 73. 1938).

Bellota costaricensis Mez in Jahrb. Bot. Gart. Berlin 5: 27, t.3, fig. 24. 1889; Standley in Field Mus. Publ. Bot. 18: 450. 1937.

Boldus costaricensis Kuntze, Rev. Gen. 2: 569. 1891.

DISTRIBUTION: Costa Rica, in wet woods and along river-banks on volcano-slopes, at an altitude of 1600-2400 m.

COSTA RICA: Alajuela: San Pedro de San Ramón, *Brenes* 22563 (fl., fr., Ch); La Brisa de Zarcero, Alfaro Ruiz, *A. Smith P.C.* 268 (fl., Ch), *H.* 442 (fl., Ch); Zarcero, *A. Smith P.* 2316 (fl., A); Palmira, Alfaro Ruiz, *A. Smith H.* 681 (fl., Ch), 4169 (fl., Ch); La Ventolera, on the southern slope of Volcán de Poás, *Standley* 34579 (fr., US). Heredia: Cerro de las Caricias, north of San Isidro, *Standley & Valerio* 52072 (fl., US); bank of Río Segundo, mountains of Volcán de Barba, *Tonduz* 1794 (fr., US). San José: Highest Carpintera, *Stork* 1399 (fr., Ch); Santa María, *Stork* 1735 (fr., Ch); Candelaria, *Hoffman* 857 (fl., TYPE of *Bellota costaricensis* not seen, photo. at GH); El Tablazo de San José, *Valerio* 33 (fl., Ch). Cartago: Near Camp Empalme, *Little* 6023 (fr., A, Y).

NATIVE NAMES: "Ira," "Ira colorado," "Ira rosa" (Costa Rica).

At the present time this is the second representative of the genus to be found in Central America or Mexico. It reaches a height of 12-18 m., with a base up to 40 cm. in diameter. Typically, the specimens show the yellowish green color of the alternate leaves noticeable even in the dried state, and the loose, coarse, conspicuous reticulation more prominent on the lower than on the upper surface. The dark brown, minutely appressed-pubescent branchlets become glabrous, gray-rugose with age. The coriaceous leaf-blades, early pubescent and glabrous at maturity, are obovate-elliptic to spatulate, with the apex rounded to obtuse or obtusely acute, occasionally emarginate, and the base acutish, decurrent into a thick minutely appressed-pubescent rugulose petiole up to 1 cm. in length. The margin is recurved and the midrib is thick, broadened at the base and exceedingly prominent beneath. The glabrous inflorescence is a loose panicle, 5-15 cm. long, bearing numerous pale yellow glabrous obconical flowers. The broad fleshy perianth-lobes are as long as or slightly exceed the tube. The three outer rows of stamens are fertile; those of the third and inner row are larger, exserted, and biglandular. The fourth row, according to Kostermans, consists of three thin, sagittate, stipitate staminodia, inserted below the stamens as is typical of the genus. I have seen no staminodia in the flowering specimens which I have examined. The fruit is ellipsoid, up to 15 mm. long and \pm 8 mm. in diam., green, subtended by a red fleshy cupule approximately 1 cm. deep and broad, topped by six distinct teeth, the remnants of the perianth-lobes which have enlarged with the tube.

2. *Aiouea Lundelliana*, sp. nov.

Arbor 12-30 m. alta, ramulis brunneo-griseis rugosulis verruculosis. Folia alternata, verticillata, juventute ferrugineo-sericeo-pubescentia mox glabra, petiolis alatis crassis glabris canaliculatis, ad 2 cm. longis et 4 mm. latis, laminis supra glabris, subtus leviter et obscure pubescentibus, coriaceis, in sicco utrinque brunneis, obovato-ellipticis, ad 16 (-18) cm. longis et 7.5 cm. latis, basi attenuato-cuneatis, in petiolum decurrentibus ibique valde recurvatis, apice rotundatis vel late acutis vel abrupte late et obtuse acuminatis, interdum emarginatis, margine recurvatis, penninerviis, costa

supra haud subitus conspicue et crasse elevata, nervis 7- vel 8-paribus supra obscure impressis subitus elevatis angulo 45° divergentibus, rete venularum supra obscurissimo subitus prominulo. Inflorescentia axillaris, late paniculata, ad 20 cm. longa, glabrescens, multiflora, longipedunculata. Flores ad 3 mm. longi, pedicellati, pedicellis ad 3 mm. longis, gracilibus, perianthio subcampanulato, flavescenti-viridescente, fragrante, lobis \pm oblongis non-nihil membranaceis pubescentibus, \pm 1.9 mm. longis; staminibus ser. I & II \pm 1.25 mm. longis, antheris filamentis aequalibus, ser. III \pm 1.7 mm. longis, antheris leviter angustioribus, interdum 4-locularibus; staminodiis nullis; gynaecio glabro \pm 2.15 mm. longo, ovario ovoides stylo aequali, stigmate parvo inconspicuo. Fructus immaturus(?) viridis, oblongus, 16 \times 8 mm., cupula campanulata plus minusve verruculosa crasse 6-dentata glabra 6-7 mm. longa, 3 mm. lata, et 6 mm. diam. subtentus, pedicello incrassato glabro 3 (-5) cm. longo.

DISTRIBUTION: Panama, up to 2000 m. altitude.

PANAMA: Chiriquí: In shady moist habitat, Río Chiriquí Viejo Valley, near El Volcán, just above the house near Colton's coffee finca, August 10, 1938, P. White 225 (fl., TYPE, Mo) (tree 12-15 m. tall, 30-35 cm. in diam.; flowers yellowish green, fragrant); vicinity of Cerro Punta, P. H. Allen 1570 (fr., Ch, GH, Mo) (tree 30 m.); rain-forest, Bajo Chorro, Boquete, Davidson 435 (fr., A, Ch, Mo).

This species differs from the Costa Rican entity in having larger leaf-blades (up to 16 [-18] cm. long and up to 7.5 cm. broad) that are abruptly, obtusely, and shortly acuminate, with the reticulation on the lower surface only slightly prominent. The leaf-blades of *A. costaricensis* are usually not more than 12 (occasionally 13) cm. long and not more than 5 (occasionally 6) cm. broad. The apex is obtuse or rounded, very seldom abruptly and obtusely shortly acuminate, and the reticulation is strikingly conspicuous beneath.

The species is named for Dr. C. L. Lundell, who has contributed much to our knowledge of Central American Lauraceae.

8. *Aniba Aublet*

Aniba Aublet, Pl. Guian. 1: 327, 3: t. 126. 1775; Mez in Jahrb. Bot. Gart. Berlin 5: 50. 1889; Kostermans in Rec. Trav. Bot. Néerl. 35: 866. 1938 (Meded. Bot. Mus. Utrecht 48: 926. 1938).

Ayndendron Nees & Martius in Linnaea 8: 36. 1833, p.p.; Nees, Syst. Laurin. 22, 245, 675. 1836; Meissner in DC. Prodr. 15¹: 88. 1864.

DISTRIBUTION: Tropical South America east of the Andes, principally, with one species in Mexico and two in the West Indies.

1. *Aniba mexicana* Kostermans in Rec. Trav. Bot. Néerl. 35: 926. 1938 (Meded. Bot. Mus. Utrecht 48: 926. 1938).

DISTRIBUTION: Known only from the type-collections, from Oaxaca.

MEXICO: Oaxaca: Cumbre de Teotalcingo, Liebmann (Lauraceae 104) (fr., SYNTYPE not seen); San Rafael (Cerro Espino), alt. 800 m., Reko 3563 (fr., SYNTYPE, US).

I have seen only one syntype of this native Mexican tree of whose position in the genus Kostermans is uncertain. He describes it as having thick, somewhat angled branchlets, minutely pilose toward the apex, presently glabrescent, cylindrical branches cinereous, glabrous, and studded with frequent conspicuous lenticels, and yellowish-hirsute buds. The alternate

glabrous chartaceous leaf-blades are elliptic, 14–24 × 5–8 cm., the base acutish, the margin recurved and undulate, the apex distinctly acuminate, often abruptly so, the acumen verging toward caudate. Their upper surface is opaque, greenish, almost smooth, the costa prominent, the lateral nerves barely so, as well as the reticulation. The lower surface is, according to Kostermans, almost shining, densely prominulous-reticulate, the costa strongly prominent, and the lateral nerves 12–15 pairs, erect-spreading-arcuate, and prominent. The glabrous scarcely canaliculate petioles, 10–12 (–20) mm. long, are blackish in contrast to the gray branchlets. As yet the flowers have not been seen. The infructescence is a glabrous pyramidal subterminal panicle up to 5 cm. long. The fruit is ovoid-subglobose, truncate at the base, smooth, mucronulate, up to 12 mm. long and 10 mm. broad, subtended by a thickened, woody, hemispherical, subglobose cupule which is minutely verrucose, sparsely ferruginous-maculate, smooth-margined, measuring up to 15 mm. long, 17 mm. in diam., and 10 mm. deep. The pedicels are obconical, about 5 mm. long and 6 mm. in diameter at the apex.

Kostermans mentions that his species is near *Aniba citrifolia*, differing in form and texture of the leaves, but places it under "species incertae sedis." There can be no doubt, however, that this species is an *Aniba*. The simple margin of the cupule removes it from *Licaria*, and the woody cupule subtended by a short equally woody pedicel precludes the possibility of its belonging to *Endlicheria* or to *Aiouea*.

9. *Endlicheria* Nees¹

Endlicheria Nees in Linnaea 8: 37. 1833 (non Presl), Syst. Laurin. 365. 1836; Meissner in DC Prodr. 15¹: 172. 1864; Kostermans in Meded. Bot. Mus. Utrecht 25: 41. 1936, in Rec. Trav. Bot. Néerl. 34: 532. 1937 (Meded. Bot. Mus. Utrecht 42: 532. 1937).

DISTRIBUTION: Tropical Central and South America, as well as the West Indian Islands.

1. *Endlicheria Browniana* Mez in Jahrb. Bot. Gart. Berlin 5: 115. 1889; Kostermans in Rec. Trav. Bot. Néerl. 34: 532. 1937 (Meded. Bot. Mus. Utrecht 42: 532. 1937).
Ayendron macrophyllum Meissner in DC. Prodr. 15¹: 92. 1864.
Oreodaphne glomerata Seeman, Fl. Panama in Bot. Voyage H.M.S. Herald 193. 1854.

DISTRIBUTION: Known only from Panama.

PANAMA: Bocas del Toro: Fish Creek Mts., vicinity of Chiriquí Lagoon, *von Wedel* 2257 (♂ fl., Mo). Darién: Cape Corrientes, on the sea-coast, *Seemann* 1094, 1094 bis (♂, ♀, TYPE of *O. glomerata* not seen).

This single representative of the genus *Endlicheria* in Central America is a tree 20 m. high, with thick, subterete branchlets minutely yellowish-appressed-tomentellous, and with buds densely sericeous-tomentellous (or tomentose). The alternate coriaceous broadly elliptic acute, somewhat obtuse or shortly acuminate leaf-blades are 22–40 cm. long and 10–15 cm. wide, early silvery-sericeous, subtended by a stout obscurely canaliculate sulcate petiole that measures 1–2 cm. long and is densely sericeous-tomentellous. The upper surface of the leaves is green, glabrous, and shining, with prominent venation and coarse loose reticulation. The slightly arcuate

¹For complete synonymy and discussion of the name *Endlicheria*, see Kostermans in Meded. Bot. Mus. Utrecht 25: 41. 1936.

lateral nerves are 8 or 9 pairs. The lower surface, at first densely silvery-sericeous, later becomes more sparsely sericeous. The paniculate few-flowered sericeous-tomentellous inflorescence is axillary and up to 15 cm. long, with rather thick short peduncles, and with pedicels up to 2 mm. long. The ♀ flowers are pink, pilose, 2.5–3 mm. long, with an urceolate tube 1.5 mm. long, slightly constricted at the apex, and with the inner surface sericeous-tomentellous. The equal perianth-lobes are erect-spreading, fleshy, somewhat flat, narrowly ovate, acutish, 1.5 mm. long, with the inner surface tomentellous. The stamens are in 3 series, minute (0.75 mm. long), well developed, substerile. The anthers are ovate, acutish or truncate with the connective distinctly protruding beyond the small cells. The filaments are very short, broad, and densely pilose, with minute basal glands present on the third series. The ovary is very large, immersed in the perianth-tube, densely verruculose (sericeous-tomentellous), thickly ovoid, attenuate at the apex into a short style with a distinct discoid subtriangular stigma. The fruit is unknown, but the subtending cupule is subhemispherical, rather smooth, up to 11 mm. in diameter and 8 mm. high, merging into the obconical pedicel, which is 1 cm. long.

The von Wedel number certainly seems to be a staminate flowering specimen of this species. The locality is comparable, both being along the Atlantic sea-board. The leaves and branchlets are similar. The inflorescence unfortunately is past anthesis and the flowers are mostly unattached. However, one finds a flower cream-colored, according to the collector, which is infundibuliform, measuring about 3 mm. long, supported by a very slender pedicel up to 2.5 mm. long. The tube is slightly urceolate. The six equal perianth-lobes are thin, oblong, acutish, slightly pubescent without, and up to ± 1.7 mm. long. The two outer series of stamens are ± 0.8 mm. long, broadly ovate with an obtuse connective, sessile, the anther-cells located just above the middle of the anther seemingly introrse but with a tendency toward becoming lateral, their outer margins coinciding with the margin of the anther. The stamens of the inner series are ± 1 mm. long, ovate, but the apex almost narrowly truncate, the connective scarcely protruding, the extrorse sublateral cells located near the apex of the anther. The interior of the well-developed perianth-tube is so mucilaginous that it is difficult to separate the individual structures. No ovary or staminodia were seen.

10. *Cryptocarya* R. Brown

Cryptocarya R. Brown, Prod. Fl. Nov. Holl. 1: 402. 1810; Nees in Wall. Pl. As. Rar. 2: 61, 69. 1831, Syst. Laurin. 192, 205. 1836; Meissner in DC. Prodr. 15¹: 68. 1864; Kostermans in Rec. Trav. Bot. Néerl. 34: 557. 1937 (Meded. Bot. Mus. Utrecht 42: 557. 1937) [footnote noting a motion pending conservation of *Cryptocarya*].

DISTRIBUTION: Tropics of both hemispheres, with less than a dozen known species in South America, Central America, and Mexico.

KEY TO THE SPECIES OF CRYPTOCARYA

A. Leaf-blades elliptic, obtusely acuminate, not longer than 12.5 cm., the base cuneate; lateral nerves up to 8 pairs; reticulation apparent throughout..... 1. *C. Kostermansiana*.

A. Leaf-blades oblong, more or less sharply acuminate, the base cuneate or subcordate; lateral nerves up to 12 pairs; no reticulation apparent.....2. *C. Hintonii*.

1. *Cryptocarya Kostermansiana*, sp. nov.

Arbor 8 m. alta, ramulis fuscis angulatis pallide ferrugineo-tomentosis mox sparse pubescentibus. Folia alternata vel subopposita, petiolis gracilibus pubescentibus ad 1.5 cm. longis et 2 mm. latis, laminis juventute sparse pubescentibus, mox glabris, pergaminateis, subcoriaceis fide coll., concoloribus, ellipticis, ad 12.5 cm. longis et 5 cm. latis, basi cuneatis apice leviter et obtuse subacuminatis, penninerviis, costa nervis lateralibus ad 8-paribus, supra obscuris subtus satis elevatis, rete venularum utrinque tenui. Inflorescentia axillaris, paniculata, ad 10 cm. longa, minute et sparse pubescens. pedunculo ad 4 cm. longo glabrescente. Flores ad 3 mm. longi, pedicellis brevibus 1 mm. vel minus longis pubescentibus, perianthio subcampanulato pallide viridescente pubescente, tubo urceolato, lobis ovatis plus minusve crassis, pubescentibus, marginibus hyalinis, ± 1.25 mm. longis; staminibus ser. I & II ± 0.8 mm. longis, antheris ovatis quam filamentis duplo longioribus, ser. III ± 1.25 mm. longis, biglandulosis, connectivo subtruncato auctis; staminodiis ovato-acuminatis sessilibus pubescentibus, ± 0.8 mm. longis; gynaecio glabro ad ± 1.9 mm. longo, ovario ovoideo stylo aequali, stigmate obtuso inconspicuo. Fructus ignotus.

DISTRIBUTION: Known only from the type-locality.

COSTA RICA: Alajuela: Naranjo, in reddish clay-loam on grave-site with nearly open exposure, alt. 1150 m., Feb. 24, 1940, A. Smith P. 2418 (fl., TYPE, A) (tree 8 m., with trunk-base 30 cm., erect, the crown expanded, the bark light brown, finely granulate; leaves subcoriaceous, semi-rigid, dark green, opaque, glabrous, the venation rather faint; perianth campanulate, pale green, the pedicel and ovary bright green).

This species superficially resembles *Aiouea costaricensis*, but it is easily separated by the presence of staminodia and by the urceolate tube of the perianth. Although there is no doubt that this species belongs to the genus *Cryptocarya*, there is nothing very distinctive or characteristic about it as an entity. It is easily separable from the only other species from this region by the leaves. *Cryptocarya Hintonii* has definitely oblong leaf-blades much larger (to 20 cm.) and more or less cordate at the base.

The species is named for Dr. A. J. G. H. Kostermans, who has done more exhaustive work on the Lauraceae than any taxonomist of this century.

2. *Cryptocarya Hintonii*, sp. nov.

Arbor magna, ramulis rubescentibus leviter subpruinosis, mox fuscacentibus vel griseis, minute sed conspicue lenticellatis, rugosulis, glabris. Folia alternata, petiolis gracilibus glabris rubescentibus canaliculatis ad 1.5 cm. longis et 1.5 mm. latis, laminis utrinque glabris, leviter coriaceis, in sicco brunneis, oblongis, ad 20 cm. longis et 5 cm. latis, basi cuneatis vel saepe subcordatis, apice acuminatis, penninerviis. costa supra conspicue impressa, subtus crasse elevata, nervis lateralibus plus minusve 12-paribus, supra obscuris subtus obscurissimis, rete venularum utrinque obscuro. Inflorescentia ignota. Infructescencia nonnihil paulo incrassata, ad 8 cm. longa, rubescens, glaber. Fructus niger, lucidus, ellipticus, 22 \times 16 cm., basi rotundatus, apice mucronatus, pedicello paulo incrassato rubescente ad 1 cm. longo, apice 2 mm. diam. expanso, insidens.

DISTRIBUTION: Known only from the type-locality.

MEXICO: Michoacán: Woods of Sierra Naranjillo, Coalcomán, alt. 1400 m.,

May 5, 1939, Hinton 13737 (fr., TYPE, GH) (large tree; leaves poisonous to cattle?; flowers collected from same tree).

NATIVE NAME: "Ucaz."

This *Cryptocarya* from Mexico very distinctly recalls members of the genus found in the Pacific. Hinton speaks of flowers having been collected from the same tree. Unfortunately there were no flowers with the number at the Gray Herbarium. The habit and fruit bespeaks the genus *Cryptocarya*. Various characteristics easily separate the entity from the only other *Cryptocarya* from the area under study at the present time.

11. *Licaria* Aublet

Licaria Aublet, Pl. Guian. 1: 313, 3: t. 121. 1775; Kostermans in Meded. Bot. Mus. Utrecht 42: 575-604. 1937 (Rec. Trav. Bot. Néerl. 34: 575-604. 1937).

Misanteca Schlechtendal & Chamisso in Linnaea 6: 367. 1831.

Acrodiclidium Nees, Laur. Expos. 13. 1833; Kostermans in Meded. Bot. Mus. Utrecht 37: 719-754. 1936 (Rec. Trav. Bot. Néerl. 33: 719-754. 1936).

Chanekia Lundell in Phytologia 1: 177. 1937.

DISTRIBUTION: Mexico, Central and South America.

KEY TO THE SPECIES OF LICARIA

- A. Leaf-blades caudate-acuminate.
- B. Leaf-blades 5-9.5 (-10.5) × 1.6-3.2 cm., lanceolate-oblong; petioles grayish-pubescent; inflorescences 2-3.5 cm. long; flowers white.....1. *L. caudata*.
- B. Leaf-blades 8-12 × 3-4 cm., elliptic; petioles glabrous; inflorescences 5-11 cm. long; flowers red at the base, yellow at the apex.....2. *L. Cufodontisii*.
- A. Leaf-blades acuminate in varying degrees.
- B. Largest leaf-blades not less than 14 cm. long.
- C. Inflorescences not in heads.
- D. Lower surface of leaf-blades, petioles, and branchlets not heavily and conspicuously tomentose.
- E. Largest leaf-blades up to 25 cm. long.
- F. Panicles rusty-tomentellous; petioles up to 23 mm. long.....3. *L. excelsa*.
- F. Panicles glabrous; petioles not more than 20 mm. long.....4. *L. glaberrima*.
- E. Largest leaf-blades not more than 15 cm. long.
- F. Lateral nerves diverging from the costa at an angle of $\pm 35^\circ$; apex usually sharply acuminate.....5. *L. Pittieri*.
- F. Lateral nerves diverging from the costa at an angle of $\pm 45^\circ$; apex usually not sharply acuminate.....6. *L. Cervantesii*.
- D. Lower surface of leaf-blades, petioles, and branchlets heavily and conspicuously tomentose.....7. *L. Peckii*.
- C. Inflorescences in heads.....8. *L. capitata*.
- B. Largest leaf-blades not more than 12 cm. long.
- C. Leaf-blades entirely glabrous, heavily coriaceous.....9. *L. coriacea*.
- C. Leaf-blades pubescent beneath, more or less coriaceous.
- D. Lower surface of leaf-blades and branchlets reddish brown-tomentose; petioles densely tomentose, 6 mm. long.....10. *L. mexicana*.
- D. Lower surface of leaf-blades and branchlets appressed-whitish-sericeous, if at all pubescent; petioles finely minutely pubescent, usually 4-8 cm. long.....11. *L. campechiana*.
- A. Leaf-blades acute or obtuse.
- B. Leaf-blades lanceolate (attenuate), not more than 2 cm. broad, coriaceous, the margin not crisped.....12. *L. lucida*.

B. Leaf-blades elliptic to (rarely) subobovate, up to 4.5 cm. broad, more or less chartaceous, the margin more or less crisped..... 13. *L. misantlae*.

1. *Licaria caudata* (Lundell) Kostermans in Meded. Bot. Mus. Utrecht 42: 596. 1937
(Rec. Trav. Bot. Néerl. 34: 596. 1937).

Chanekia caudata Lundell in Phytologia 1: 178. 1937.

Acrocididium caudatum Lundell in Amer. Midl. Nat. 19: 428. 1938.

DISTRIBUTION: Forests of British Honduras, at an altitude of about 600 m., and adjoining Guatemala.

BRITISH HONDURAS: El Cayo: Arenal-Valentin road, in advanced forest, June-Aug. 1936, Lundell 6183 (fl., ISOTYPE of *Chanekia caudata*, GH, NY) (tree 7 m., diam. 7.5 cm.; fls. white). Toledo: Camp 32, British Honduras-Guatemala Survey, Schipp 1279 (fl., fr., A, GH, NY). GUATEMALA: Izabal: Bay of Santo Tomás, between Escobas and Santo Tomás, Steyermark 39355 (fr., Ch); along Río Bonita, Steyermark 41713 (fr., Ch).

This species is seemingly closely related to *Licaria Cufodontisii*, from Costa Rica, although the type of the latter is not available at present. The leaf-blades of *L. caudata*, however, usually measure less than 10×3.2 cm., are lanceolate-oblong, borne on petioles covered with a whitish pubescence, and the white-flowered inflorescences are never longer than 3.5 cm. On the other hand, the elliptic leaf-blades of *L. Cufodontisii* attain a length of 12 cm. and a width of 4 cm., and are borne on glabrous petioles, while the inflorescences are up to 11 cm. in length, bearing flowers which are red at the base and yellowish at the apex. The fruits of *L. caudata* are borne in cupules which measure about 4.5 mm. deep and flare about 1 cm. in diameter, the double margins being rather inconspicuous. The enlarged pedicel is up to 5 mm. long and increases from 1 mm. in diameter at the base to over 2 mm. at the apex. The cupule (to 7 mm. deep) of *L. Cufodontisii* is conspicuously though shallowly double-margined, the outer margin undulate. The cupule is subtended by a slender pedicel, enlarged to 3-4 mm. at the apex and up to 1 cm. long. Another superficial resemblance is noted between *L. caudata* and *L. coriacea* and is discussed under the latter species.

2. *Licaria Cufodontisii* Kostermans in Meded. Bot. Mus. Utrecht 42: 591. 1937 (Rec. Trav. Bot. Néerl. 34: 591. 1937).

Acrocididium Cufodontisii Lundell in Amer. Midl. Nat. 19: 428. 1938.

DISTRIBUTION: Costa Rica, known only from the vicinity of the type-locality.

COSTA RICA: Puntarenas: Peninsula Osa near Golfo Puerto Dulce, around Puerto Jiminez, on banks toward Sto. Domingo, *Cufodontis* 187 (fl., TYPE not seen) (fl., Apr.); margins of tidal estuary between Puerto Jiminez and Sto. Domingo de Osa (Puerto Viejo), *Brenes* 12262 (fl., Ch); Nicoya, *Tonduz* 13863 (fr., GH).

Fructus ellipsoideus, in sicco nigrescens, cupula vadosa ad 8 mm. alta, 12 mm. diam., margine duplice et inconspicue valde proximo, exteriore leviter undulato, interiore integro, pedicellis crassis, apice 3 mm., 1.5 cm. longis.

Kostermans remarks that this species is near *L. triandra*, from the West Indies, differing in form and texture of the leaves and floral characters. The following differences between these two species are noted. The leaf-blades of the West Indian species are ovate- (rarely) or lanceolate-elliptic, subtended by petioles 10-14 mm. long, whereas the leaf-blades of the Costa Rican species are elliptic, with petioles less than 8 mm. in length. The

pedicels of *L. triandra* are thickish, slightly pilose, becoming glabrous, 1.5 mm. long, as opposed to the slender, minutely and loosely cinereous-tomentellous pedicels, up to 3 mm. long, found in *L. Cufodontisii*. The flowering specimen of Brenes answers the description by Kostermans very well. The fruiting specimen differs only in the leaf-blades being more leathery and more robust. Both of these numbers show leaf-blades with a tendency toward an undulate margin. The fruit is ellipsoid, up to 12 mm. long, subtended by a shallow flaring cupule up to 8 mm. deep and to 12 mm. in diameter. The double margin is inconspicuous, the outer being only about 1 mm. lower than the upper and only slightly undulate. The pedicels are enlarged to 1.5 cm. long and 3 mm. broad at the apex.

Tonduz, on his label of no. 13863, states that this number represents the fruiting specimen of no. 13809, also from Nicoya. The latter is definitely a flowering specimen of *Ocotea veraguensis*. Its leaf-shape and venation, as well as its inflorescences, are entirely different from those of *Tonduz 13863*.

3. *Licaria excelsa* Kostermans in Meded. Bot. Mus. Utrecht 42: 595. 1937 (Rec. Trav. Bot. Néerl. 34: 595. 1937).

Acrodielidium excelsum Lundell in Amer. Midl. Nat. 19: 428. 1938.

DISTRIBUTION: Panama and adjacent Costa Rica.

COSTA RICA: Alajuela: Cataracts of San Ramón, *Brenes* 13523 (fl., Ch).

PANAMA: Chiriquí: Southern slope of the mountain in moist forest, Cerro de la Horqueta, near castle of Las Siguas, in 1911, *Pittier* 3200 (fr., ISOTYPE, Ch) (large tree); rain-forest of Bajo Chorro, Boquete, *Davidson* 361 (fr., Ch).

NATIVE NAME: "Siguatón" (Panama).

This is one of the largest-leaved species to be found in Mexico and Central America. A large tree, the branchlets are thick, glabrous, almost shining, borne on smooth gray branches; the rigidly coriaceous leaf-blades also are glabrous and almost shining, elliptic, 20 (–24) × 5.5 (–8) cm., acuminate and shortly acute at the base. The stout glabrous petiole measures up to 23 mm. long. The axillary panicle, densely ferruginous-sericeous-tomentellous before anthesis, lengthens in fruit to 15 cm. and becomes glabrous. The fruit is smooth, ellipsoid-ovoid, subtended by a cupule almost hemispheric-cylindrical, 20 mm. high, 25 mm. in diameter, and 16 mm. deep, with an obscurely double margin. The outer margin is entire and thickened, the inner, extending less than 2 mm. above the outer, is thinner, exhibiting a tendency at intervals to split toward the base. The pedicels become enlarged up to 15 mm. long and 10 mm. diameter at the apex.

4. *Licaria glaberrima* (Lundell), comb. nov.

Acrodielidium glaberrimum Lundell in Lloydia 4: 46. 1941.

DISTRIBUTION: Mexico, known only from the type-locality.

MEXICO: Chiapas: Volcán de Tacaná, on north side, alt. 2100 m., April 2, 1939, *Matuda* 2981 (fl., TYPE, Mich.).

The complete glabrosity, coupled with just about the largest leaves known for the genus in this area, immediately sets this species apart. The coriaceous elliptic leaf-blades measure over 25 cm. long and up to 10 cm. broad, are acuminate, almost shining above and densely and very conspicuously reticulate beneath. The costa and lateral nerves are comparatively incon-

spicuous above, being either flush with the surface or slightly impressed. On the lower surface they are elevated and exceedingly prominent. The sturdy petioles, up to 2 cm. long, as well as the striate shining branchlets, are dark brown. No close affinity of this species has been discovered thus far.

5. *Licaria Pittieri* (Mez), comb. nov.

Misanteca Pittieri Mez in Bull. Herb. Boiss. II: 3: 230. 1903; Standley in Field Mus. Publ. Bot. 18: 452. 1937.

Misanteca costaricensis Johnston in Contr. Gray Herb. n. s. 70: 70. 1924.

DISTRIBUTION: Known only from Costa Rica.

COSTA RICA: Alajuela: Hills of San Pedro de San Ramón, *Brenes* 5023, 5489 (fr., Ch); hills of Santiago, near San Ramón, alt. 1100 m., June 1, 1901, *Brenes* 14403 (fl., type of *M. costaricensis*, GH) (tree 8–10 m.); woods above San Ramón, *Tonduz* 17589 (fr., US). San José: Vicinity of Zapote, *Standley* 40238 (fr., US); Santa María, *Stork* 2332 (fl., Ch); Hacienda Belmira, near Santa María, alt. 1450 m., Jan. 1898, *Tonduz* 11612 (fr., isotype of *M. Pittieri*, GH, US).

NATIVE NAME: "Quizarrá" (Costa Rica).

Kostermans includes both *M. costaricensis* and *M. Pittieri* under *Licaria limbosa*, a South American species. Although there is no specimen of the latter at hand, the fairly accurate drawing of *Laurus limbosa*, its basis, in Ruiz & Pavon, Flora Peruviana Laurographia, plate 361, shows the species to have a cupule with a less markedly double edge than the cupule of *L. Pittieri*. Also, the lateral nerves of the South American species are more arcuate than those of the Costa Rican specimens. The inflorescence of our species differs from that of *L. limbosa*, the axillary panicles of the latter ranging from 4 to 7 cm. in length. The distinctly subterminal panicles of *L. Pittieri* measure about 15 cm. long and 6–12 cm. broad.

6. *Licaria Cervantesii* (H.B.K.) Kostermans in Meded. Bot. Mus. Utrecht 42: 587. 1937 (Rec. Trav. Bot. Néerl. 34: 587. 1937).

Laurus Cervantesii H.B.K. Nov. Gen. & Sp. 2: 134 [169]. 1817.

Misanteca Juergensenii Mez in Jahrb. Bot. Gart. Berlin 5: 102. 1889; Standley in Contr. U. S. Nat. Herb. 23: 292. 1922.

Acrodiclidium Cervantesii Lundell in Amer. Midl. Nat. 19: 428. 1938.

DISTRIBUTION: Southern Mexico, along the coast, Guatemala, and British Honduras, at 250–750 m. altitude.

MEXICO: Guerrero: In mountains near Mazatlán (Mazatlán), alt. 990 m., *Humboldt & Bonpland* (fr., photo. of type of *Laurus Cervantesii*, Ch, NY); near Chilpancingo, Las Cajones, Acapulco, *Gamon* 22 (fr., Y); Montes de Oca, Vallecitos, *Hinton* 10194 (fl., fr.), 10273 (fr.), 10290 (fl.), 10291 (fr., GH). Oaxaca: Near Pinotepa, *Juergensen* 176, 177 (syntypes of *Misanteca Juergensenii* not seen); Chinantla, Choapán, *Galeotti* 260 (fl., fr., isotype of *Misanteca Juergensenii*, US); Juquila, Río Mapache, near Tepenixtlahuaca, *Conzatti* 4366 (fr., US); Pochutla, Magdalena, *Conzatti*, *Reko & Makrinius* 3205 (fr., GH); from Río Verde to Panixtlahuaca, *Nelson* 2383 (fr., Ch); between Juquila and Nopala, *Nelson* 2412 (fr., Ch). GUATEMALA: Alta Verapaz: Matacui, *J. D. Smith* 1650 (fl., fr., US); near Tucurú, *Standley* 70718 (fr., Ch). BRITISH HONDURAS: Belize: Belize River, *Record B.H.* 51 (Y 8819) (fr., NY, Y).

NATIVE NAMES: "Aguacatillo" (Guerrero); "Ahuacatillo" (Oaxaca).

Kostermans states that this species is very difficult to distinguish from *L. limbosa* of South America, the only difference being the free glands of the

flower. Since he included *Misanteca costaricensis* and *M. Pittieri* (in my opinion a single species) under *L. limbosa*, it is sufficient at this time to mention the points of difference between *L. Cervantesii* and the Costa Rican entity. As one may note, the latter has a longer and a subterminal inflorescence as opposed to the short axillary panicles of *L. Cervantesii*. The Costa Rican species shows leaf-blades with the apex sharply acuminate and with lateral nerves diverging at an angle of about 34° , as opposed to the more broadly acuminate apex and nerves diverging at an angle of about 45° to be found in the leaf-blades of *L. Cervantesii*. The cupule of the latter species is on the whole more shallow (1 cm. long) and the entire inner margin often extends about 5 mm. above the outer deeply lobed margin. In the case of *L. Pittieri*, the cupule measures nearly 1.5 cm. long and the inner margin is about 2 mm. higher than the outer shallowly lobed margin. At maturity the exposed portion of the fruit of *L. Cervantesii* is longer than the subtending cupule, whereas the exposed portion of the fruit of *L. Pittieri* equals or measures less than the length of the cupule.

7. *Licaria Peckii* (Johnston) Kostermans in Meded. Bot. Mus. Utrecht 42: 597. 1937
(Rec. Trav. Bot. Néerl. 34: 597. 1937).

Misanteca Peckii Johnston in Contr. Gray Herb. n.s. 70: 70. 1924.

Chanekia Peckii Lundell in Phytologia 1: 178. 1937.

Acrodiclidium Peckii Lundell in Amer. Midl. Nat. 19: 428. 1938.

DISTRIBUTION: Guatemala and British Honduras.

GUATEMALA: Petén: La Libertad and vicinity, *Aguilar* 242 (fl., A, NY); *Uaxactún*, *Bartlett* 12214 (fl., fr., A, NY, US), 12236 (fr., NY, US), 12550 (fl., NY, US); Carmelita, 1 m. south of village, on trail to Flores, *Egler* 42-223 (fr., Ch); *Chimah*, *Lundell* 3435 (fr., A, Ch); Cerro Ceibal (Chorro Ceibal or Cerro San Martín), between mouth of Río Santa Mónica and mouth of Río San Martín, on left side of Río Cancuen (west side of river going downstream), *Steyermark* 46059 (fr., Ch); 46134 (fl., Ch). Alta Verapaz: La Tinta, *Maxon* & *Hay* 3346 (fr., NY); woods between Finca Cubilgütz and Hacienda Yaxcabanal, *Steyermark* 44836 (fr., Ch); savanna north of Concepción, 3-5 miles southeast of Finca Yalpemech, near Alta Verapaz-Petén boundary line, *Steyermark* 45236 (fr., Ch); vicinity of Finca Yalpemech, near Alta Verapaz-Petén boundary line, *Steyermark* 45295 (fl., Ch). Izabal: Open slopes, vicinity of Quiriguá, *Standley* 23764 (fl., NY); Río Dulce, between Livingston and 6 miles up river, on north side (right hand side going up river), *Steyermark* 39406 (fl., Ch); Río Dulce, 2-4 miles west of Livingston, on south side (left hand side going up river), *Steyermark* 39556 (fl., fr., Ch). BRITISH HONDURAS: Without locality, in 1905-07, *M. E. Peck* 826 (fl., fr., TYPE of *M. Peckii* not seen). El Cayo: El Cayo and vicinity, *Chanek* 140 (fl., Ch); Vaca, *Gentle* 2341 (fr., A); Retiro, *Lundell* 6315 (fr., GH, NY). Stann Creek: Freshwater Creek Reserve, *Pelly* 2, 26 (Y. 23716) (fr., Ch), *Stevenson V* (fr., Ch).

NATIVE NAME: "Senk-cul" (Guatemala).

Licaria Peckii is truly one of the most striking species of the family in Central America. The chartaceous, oblong, obovate-oblong, or sometimes elliptic leaf-blades show the midrib and lateral nerves deeply impressed above (with no noticeable reticulation), and elevated and pubescent beneath. The loose few-flowered racemose inflorescences with long peduncles stand out because of their thick covering of light brownish villous-hirsute pubescence. The same pubescence persists on the young branchlets also. The flowers themselves are unusual in being depressed, broad, and rather

fleshy. The fruiting pedicel is more slender than is usually the case in the genus and the double-margined cupule is thinner and comparatively smooth on the outer surface.

8. *Licaria capitata* (Schlechtendal & Chamisso) Kostermans in Meded. Bot. Mus. Utrecht 42: 592, fig. 5. 1937 (Rec. Trav. Bot. Néerl. 34: 592. 1937).

Misanteca capitata Schlechtendal & Chamisso in Linnaea 6: 367. 1831; Standley in Contr. U. S. Nat. Herb. 23: 292. 1922, in Trop. Woods 21: 17. 1930, in Field Mus. Publ. Bot. 10: 200. 1931; Standley & Record in Field Mus. Publ. Bot. 12: 142. 1936; Yuncker in Field Mus. Publ. Bot. 9: 290. 1940.

Acrodiclidium glabrum Brandegee in Univ. Calif. Publ. Bot. 6: 497. 1919.

Acrodiclidium capitatum Lundell in Amer. Midl. Nat. 19: 428. 1938.

DISTRIBUTION: Southern Mexico, Guatemala, Honduras, and British Honduras.

MEXICO: Without locality, *Kerber* 410 (fl., US). San Luis Potosí: Tamazunchale, *C.L. & A.A. Lundell* 7129 (fr., NY). Vera Cruz: Huasteca, Wartenberg, near Tantoyuca, *Ervendberg* 375 (fl., fr., GH); Jicaltepec, *Liebmamn* (*Lauraceae* 107) (fr., US); Taso del Correo ad Río Tecoluta, *Liebmamn* 730 (*Lauraceae* 111) (fr., GH); Barranca de Tenampa, Zacuapán, Sept. 1906, *Purpus* 2068 (fr., isosyntype of *Acrodiclidium glabrum*, GH, NY, US), *Purpus* 2354 (fl., GH, NY, US); Corral de Piedras, *Purpus* 7802 (fl., fr., A, GH, NY, US), *Purpus* 8096 (syntype of *Acrodiclidium glabrum* not seen), *Purpus* 8143 (fr., isosyntype of *Acrodiclidium glabrum*, GH, NY), *Purpus* 12050 (fr., A, NY); Misantla, *Schiiede & Deppe* 1148 (fl., fr., TYPE of *Misanteca capitata* not seen). Oaxaca: Between San Carlos and Pantanillo, Cordillera Centro-occidental, *Liebmamn* (*Lauraceae* 10) (fr., US), *Liebmamn* 729 (*Lauraceae* 110) (sterile, US); Tuxtepec, Chiltepec and vicinity, *Martínez-Calderón* 123, 555 (fr., A). GUATEMALA: Alta Verapaz: Cubilgüitz, von *Tuerckheim* (*J.D. Smith* 7885) (fl., fr., GH, NY, US), 4085 (fl., US). HONDURAS: Atlántida: Vicinity of Tela, *Standley* 54729 (fr., A, US); Lancetilla Valley, near Tela, *Standley* 55798 (sterile, A, US); vicinity of La Ceiba, along Danto River, slopes of Mt. Cangrejal, *Yuncker, Koepper & Wagner* 8716 (fr., GH, NY, US). Yoro: Sierra de Sulaco, *C. & V. W. von Hagen* 1032 (sterile, NY); Pijol, Subirana, *C. & V. W. von Hagen* 1327 (sterile, NY). BRITISH HONDURAS: El Cayo: Vaca, *Gentle* 2412 (fl., A); Valentim, Camp 6, *Lundell* 6408 (fr., GH, NY, US), 6539 (fr., GH, NY); Chalillo Crossing-Cohune Ridge Road, *Lundell* 6551 (sterile, NY). Toledo: *Peck* 802 (fl., GH); "Eldorado," Punta Gorda, *Schipp* 990 (fr., A, GH, NY).

NATIVE NAMES: "Laurel," "Palo misanteco" (Vera Cruz); "Laurel de la Sierra" (Oaxaca); "Aguacatillo" (Honduras).

Probably the best known and most easily recognized species in the genus is *Licaria capitata*. Whether in flower or in fruit the long-pedunculate compact heads are distinctive. The very large (up to 25 × 10 cm.) elliptic acuminate leaf-blades are heavily coriaceous, usually more or less obscurely reticulate and shining above.

9. *Licaria coriacea* (Lundell) Kostermans in Meded. Bot. Mus. Utrecht 42: 604. 1937 (Rec. Trav. Bot. Néerl. 34: 604. 1937).

Chanekia coriacea Lundell in Phytologia 1: 179. 1937.

DISTRIBUTION: In mountains and along river-banks of eastern Guatemala and western British Honduras.

GUATEMALA: Izabal: Bank of Río Dulce, *C.L. Wilson* 376 (fl., Ch); along Río Dulce below junction with Río Tameja, *Steyermark* 42015 (fl., Ch). Zacapa: Between Cerro de Monos and upper slopes of Monte Virgin, *Steyermark* 42872 (fl., Ch).

BRITISH HONDURAS: Toledo: Camp 31, British Honduras-Guatemala Survey, occasional in shady valley, also on hilltop in open places, alt. 630 m., Feb. 22, 1934, *Schipp* 1282 (fr., ISOTYPE of *Chanekia coriacea*, A, GH, NY) (small tree 9 m., 22.5 cm. in diam.; flowers white; fruits black with red pedicels).

Kostermans, with only fruiting material at hand, identified this species with *L. triandra* of the West Indies; but he felt sure that it is a different entity because of its locality. If we may ignore the difference occasioned by the extremely coriaceous texture of the leaf-blades and a more acuminate rather than caudate-acuminate apex, there is apparent a striking similarity between this species and *L. caudata*, both described from approximately the same locality. Schipp 1279, cited by Lundell under *Chanekia caudata*, was collected very near the type-number of *L. coriacea*. The reticulation and venation of the leaf-blades of the two species is similar, as well as the bark of the branchlets. However, there is attached to the Gray Herbarium sheet of *L. caudata* (no. 1279) an old fruit which definitely separates this species from *L. coriacea*. The fruit of the latter is ellipsoid, about 1.7 × 1.2 cm., abruptly short-apiculate, subtended by a shallow accrescent obviously double-margined verrucose cupule, 1.6–2.3 cm. in diam. and 1 cm. long, borne on a thick short peduncle not more than 3 cm. long, according to Lundell. The peduncles of the fruit on the Gray and Arnold specimens are not more than 1 cm. long. The old fruit of *L. caudata* is ellipsoid-ovoid and apiculate, 8–10 cm., subtended by a flat shallow slightly double-margined cupule, about 9 mm. in diam. and 2–3 mm. long, borne on a very slender, branched peduncle about 2 cm. long and 0.5 mm. thick.

10. *Licaria mexicana* (Brandegee) Kostermans in Meded. Bot. Mus. Utrecht 42: 599. 1937 (Rec. Trav. Bot. Néerl. 34: 599. 1937).

Acrodielidium mexicanum Brandegee in Univ. Calif. Publ. Bot. 6: 497. 1919.

Chanekia mexicana Lundell in Phytologia 1: 181. 1937.

DISTRIBUTION: Known only from type-locality, and vicinity, in Mexico.

MEXICO: Vera Cruz: Zacuapán and vicinity, Nov. 1906, Purpus 2293 (fr., Ch, GH); near Tlacoquintla, June 1917, 8081 (fl., ISOTYPE of *A. mexicanum*, A, Ch, GH), 8164 (fl., GH, NY, US), 8430 (fl., GH, NY, US), 8781 (fr., GH), 14335 (fl., fr., A).

The reddish brown tomentum clothing the lower leaf-surface, petioles, branchlets, and long peduncles of the inflorescence offers a good diagnostic character for the species. The branchlets are densely foliose. The small (8 × 2.5 cm.) oblong or elliptic leaf-blades are shortly petioled, and the slender paniculate inflorescences (about 7 cm. long and less than 1.5 cm. broad) are supported by long peduncles nearly 5 cm. in length. The fruit is subtended by a cupule whose margins approximate each other. The outer thickened and slightly undulating margin is usually shorter than the thin and entire inner margin.

11. *Licaria campechiana* (Standley) Kostermans in Meded. Bot. Mus. Utrecht 42: 599. 1937 (Rec. Trav. Bot. Néerl. 34: 599. 1937).

Phoebe campechiana Standley ex Lundell in Carnegie Inst. Wash. Publ. 436: 312. 1934, nomen nudum.

Ocotea campechiana Standley in Carnegie Inst. Wash. Publ. 461: 56. 1935; Standley & Record in Field Mus. Publ. Bot. 12: 143. 1936.

Misantheca campechiana Lundell in Carnegie Inst. Wash. Publ. 478: 209. 1937.

Chanekia campechiana Lundell in Phytologia 1: 178. 1937.

Acrodielidium campechiana Lundell in Amer. Midl. Nat. 19: 428. 1938.

DISTRIBUTION: Mexico, Guatemala, and British Honduras.

MEXICO: Campeche: Tuxpeña, Feb. 6, 1932, Lundell 1295 (fl., ISOTYPE of

Ocotea campechiana, GH, NY) (large tree), Lundell 1380 (fl., Ch, GH, NY). GUATEMALA: Petén: La Libertad, Lundell 3065 (fl., A), 3359 (fl., Ch, GH), 3409 (fl., Ch); Uaxactún, Bartlett 12339 (fl., A, NY, US). BRITISH HONDURAS: Orange Walk: Indian Church, New River Lagoon, C.S. Brown 31 (Y 13682) (fr., Ch, Y).

NATIVE NAMES: "Laurelillo" (Campeche); "Ektil," "Dzol," "Copal-chi" (Guatemala).

Licaria campechiana is striking for its appearance of extreme glabrosity. Careful examination, however, reveals closely appressed whitish-sericeous pubescence on the lower leaf-surface, petioles, and branchlets. The leaf-blades are lanceolate, more or less attenuately acuminate, coriaceous, with a midrib impressed above and very prominent beneath, and with obscure venation. The rather rigid, somewhat racemose-paniculate inflorescences are usually not longer than 2.5 cm., although occasionally they reach a length of 5 cm., of which the peduncle measures approximately one-half. I have not seen a fruit of this species but the cupule is about 1 cm. deep and 1.3 cm. in diameter, inconspicuously double-margined, and of rather thin texture. The enlarged pedicel measures nearly 2 mm. long and is about the same width at the apex.

12. *Licaria lucida* (Lundell), comb. nov.

Acrodidclidium lucidum Lundell in Contr. Univ. Mich. Herb. 7: 12. 1942.

DISTRIBUTION: Known only from the type-locality.

MEXICO: Chiapas: Santa Rosa, near Escuintla, in advanced forest, alt. 1600 m., June 20, 1941, Matuda 4239 (fr., A, TYPE — Mich, NY) (tree 10 m.).

Although no flowering collection has been made to date, the linear-lanceolate, acute to obtuse, shining, entirely glabrous leaves mark this species as differing from all other Mexican species. The nearest relative presumably is *L. campechiana*, from which it differs in its complete glabrosity and long-acute to obtuse rather than acuminate leaves. The fruit is small, ellipsoid-ovoid, 1 cm. long and \pm 8 mm. wide, subtended by a thickened more or less flaring lobed cupule \pm 1.5–2 cm. in diameter, \pm 1.5 cm. long, and \pm 0.5 cm. deep, seated on a pedicel about 4 mm. long and 2 mm. thick. Unlike the majority of fruits in this genus, that of *L. lucida* shows, in the dried state, the inner margin 5 mm. or less shorter than the thickened prominently lobed outer margin. The usual situation in the genus shows the outer margin reversed and undulating, exposing the inner margin rather than protruding beyond it. It is possible that this is due to the conditions under which the individual specimen was prepared. Further material will verify this. So far, there is no other specimen which matches the type.

13. *Licaria misantiae* (Brandegee) Kostermans in Meded. Bot. Mus. Utrecht 42: 602. 1937 (Rec. Trav. Bot. Néerl. 34: 602. 1937).

Acrodidclidium misantiae Brandegee in Univ. Calif. Publ. Bot. 6: 497. 1919.

Chaneckia misantiae Lundell in Phytologia 1: 180. 1937.

DISTRIBUTION: Known only from the type-locality, and vicinity, in Mexico.

MEXICO: Vera Cruz: Near Misantla, *Purpus* 8145 (fl., ISOTYPE of *A. misantiae*, GH, NY); Acasonica, August, 1919, *Purpus* 8433 (fl., GH, NY).

This species is unique among the Mexican and Central American *Licariae* in having elliptic or obovate leaves, usually acute, obtuse or sometimes retuse, with crisped margins. Unusual too is the very coarse reticulation

apparent on both surfaces of the leaves. No fruit is known for the species. The nearest resemblance superficially is found in *Ocotea veraguensis*, which, strangely enough, has double-margined cupules similar to those found in *Licaria*. The flowers, however, show unmistakably the *Ocotea* structure.

12. *Cassytha* Linnaeus

Cassytha Linnaeus, Sp. Pl. 35. 1753; Nees, Syst. Laurin. 641. 1836; Meissner in DC. Prodr. 15¹: 252. 1864; Bentham & Hooker, Gen. Pl. 3: 164. 1880; Hemsley, Biol. Centr. Am. Bot. 3: 77. 1882; Mez in Jahrb. Bot. Gart. Berlin 5: 489. 1889.

1. *Cassytha filiformis* Jacquin, Sel. Stirp. Amer. 115, t. 79. 1763, et Pict. t. 116. 1780, et Am. Gew. 2: 133. 1786; Standley in Field Mus. Publ. Bot. 10: 202. 1931; Standley & Record in op. cit. 12: 142. 1936; Standley in op. cit. 18: 450. 1937.

Cassytha americana Nees, Syst. Laurin. 644. 1836.

DISTRIBUTION: Tropics of the world, but not common in Central America.

This parasitic herb is unique in the family. In habit and general appearance it is similar to *Cuscuta*, of the Convolvulaceae, being yellowish throughout, with its leaves reduced to scales. The floral structure, however, is typically lauraceous.

ASIATIC SPECIES CULTIVATED IN TROPICAL AMERICA

Cinnamomum (L.) Nees & Ebermaier

Cinnamomum Camphora (L.) Nees & Ebermaier, Handb. Med. Pharm. Bot. 2: 430. 1831; Meissner in DC. Prodr. 15¹: 24. 1864; Standley in Contr. U. S. Nat. Herb. 27: 183. 1928; Standley & Calderón, Lista Prelim. Pl. Salvador 84. 1925; Standley in Field Mus. Publ. Bot. 18: 451. 1937.

DISTRIBUTION: Tropical Asia and Malaya. Cultivated in tropics throughout the world. Source of commercial camphor and also planted for ornamental purposes.

NATIVE NAME: "Alcanfor."

Cinnamomum zeylanicum Nees in Wallich, Pl. As. Rar. 2: 74. 1831; Standley in Contr. U. S. Nat. Herb. 27: 183. 1928; Standley & Calderón, Lista Prelim. Pl. Salvador 84. 1925; Standley in Field Mus. Publ. Bot. 18: 451. 1937.

DISTRIBUTION: India and Malaya. Cultivated in tropics throughout the world. Source of commercial cinnamon and also planted for ornamental purposes.

NATIVE NAME: "Canela."

ADDENDA

Since the preceding was set in type, Dr. W. A. Dayton, of the U. S. Department of Agriculture Forest Service (USFS), has kindly made available to me additional material from Panama, as well as more complete and corrected data for material already cited. Some of these specimens are cited in the following notes. Also, Dr. I. M. Johnston has since made a supplementary collection in Panama, including a new species which is described below.

15. *Persea rigens* Allen in Jour. Arnold Arb. 26: 297. 1945.

Little 6075, cited from Costa Rica, is actually from Panama. Very probably the species occurs in Costa Rica, but to date it has not been collected in that area.

PANAMA: Chiriquí: Near sawmill on Río Chiriquí Viejo, 3 km. n. of Camp El

Volcán, Little 6057 (sterile, USFS), 6058 (fl., USFS), alt. 1310 m., March 5, 1943, 6075 (fl., TYPE-Ch, USFS) (tree 27 m.; "Pizarrá").

11a. *Phoebe Johnstonii*, sp. nov.

Arbor aromatica parva ad 15 m. alta, ramulis griseo-subsericeis mox glabrescentibus deinde glabris striatis rubescentibus. Folia alternata, petioli pubescentibus mox glabris gracilis canaliculatis rubescentibus ad 1.5 cm. longis; laminis glabris, subitus nervis et glandulis axillaris exceptis, juventute membranaceis mox pergamentaceis, in sicco supra nitidis et olivaceo-viridescentibus, subitus pallidis, lanceolato-ellipticis, 8–14.5 cm. longis et 2.5–4.5 cm. latis, basi infima anguste cuneatis vel attenuate cuneatis, apice obtuse et attenuate acuminatis vel subcaudato-acuminatis, subtriplinerviis. costa pallide rubescente supra impressa subitus elevata, nervis lateralibus pallide rubescentibus 4–5-paribus, infimis conspicuis angulo 25–35° divergentibus, glandulis axillaris conspicuis, superioribus obscurioribus angulo 45° divergentibus, glandulis axillaris obscuris, rete venularum satis obscuro. Inflorescentia axillaris et subterminalis, multiracemoso-paniculata vel raro late paniculata, ad 12 cm. longa, juventute flavo-albescens, deinde rubescens, pedunculo ad 2 cm. longo striato pubescente vel glabrescente. Flores ad 6 mm. longi, pedicellis ad 3 mm. longis, perianthio subcampanulato pallide flavo, lobis ovato-ellipticis vel elliptico-lanceolatis, membranaceis, subaequalibus, ± 2.35–3 mm. longis pubescentibus; staminibus ser. I & II ± 1.7 mm. longis, antheris ovatis filamentis aequalibus, ser. III ± 2.15 mm. longis, antheris subovatis emarginatis biglandulosis, glandulis subsessilibus conspicuis reniformibus staminodiis subcordatis ovatis stipitatis, ± 1.15 mm. longis; gynaeceo glabro ± 2.5 mm. longo, ovario ovoides vel subgloboso stylo gracili subaequali, stigmate subcapitato satis conspicuo. Fructus ellipsoideus, glaber, viridis fide coll., minute apiculatus, 1 cm. longus et 7 mm. latus, cupula 5 mm. longa, 7 mm. diam., et 4 mm. alta perianthii lobis leviter incrassatis rubescentibus, fide coll., persistentibus coronata subtentus, pedicello incrassato rubescente ad 6 mm. longo.

DISTRIBUTION: Known only from the Canal Zone, Panama, at an altitude up to 80 m., and San José Island, in thickets and at edge of forest.

PANAMA: Canal Zone: Hospital grounds at Ancon, *Pittier* 2750 (fl., GH). San José Island: (Perlas Archipelago, Gulf of Panama, about 55 miles SSE. of Balboa): *Johnston* 505 (fr., A), 512 (fr., A), 553 (fl., fr., A), 583 (fr., A), 666 (fl., fr., A), 667 (fl., fr., A), M-area Road, April 11, 1945, 697 (fl., fr., TYPE, A) (tree 7.5 m. high, in thicket; flowers yellowish; fruit green, the cupule and pedicel reddish), 713 (fl., fr., A), 773 (fl., fr., A).

This species is most closely related to *Phoebe mexicana* and to *P. Ehrenbergii*. It is readily separated from the former by its shorter panicles, with flowers that are never whitish gray-pubescent, and by leaf-blades that are thinner in texture and on the whole more narrow. From the latter it may be distinguished by the many-flowered inflorescences usually not more than 8 cm. long, with flowers not more than 4 mm. long and never pruinose.

The position of this species may be indicated by the following revision of the original key occurring at the top of page 305:

D. Inflorescence composed of numerous subterminal and axillary spike-like racemosous panicles up to 15 cm. long.
E. Panicles up to 15 cm. long; flowers usually whitish gray-pubescent....
..... 11. *P. mexicana*.

E. Panicles usually less than 12 cm. long; flowers not whitish gray-pubescent..... 11a. *P. Johnstonii*.

D. Inflorescence composed of axillary and subterminal short loose few- to many-flowered panicles less than 10 cm. long and more or less glabrous.

E. Largest leaf-blades not more than 15 cm. long; lowermost pair of lateral nerves not conspicuous above the middle of the blade and less stout than the costa.

F. Inflorescence many-flowered, not more than 8 (rarely 12) cm. long; flowers not pruinose and not more than 4 mm. long..... 11a. *P. Johnstonii*.

F. Inflorescence few-flowered, up to 12 cm. long; flowers pruinose and nearly 5 mm. long..... 12. *P. Ekrenbergii*.

E. Largest leaf-blades 18-20 cm. long; lowermost pair of lateral nerves conspicuous $\frac{2}{3}$ to $\frac{4}{3}$ the length of the blade and as stout as the costa.. 13. *P. neurophylla*.

22. *Ocotea rubrinervis* Mez; Allen in Jour. Arnold Arb. 26: 353. 1945.

The nine Johnston numbers cited as "in mixed forest along South Road (S² area)," actually were collected in various areas on San José Island.

31. *Nectandra Whitei* (Woodson) Allen in Jour. Arnold Arb. 26: 398. 1945.

Little 6059, cited as from Costa Rica, actually was collected in Panama.

PANAMA: Chiriquí: Vicinity of Camp El Volcán, *Little 6047* (fl., USFS), *6056* (young fr., USFS), *6059* (young fr., Ch, USFS), *6062*, *6069* (young fr., USFS).

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

STUDIES IN THE SAPOTACEAE, III DIPHOLIS AND BUMELIA

ARTHUR CRONQUIST

A REVISION of certain groups of American Sapotaceae has been undertaken under the auspices of the Chicle Development Co. The present paper comprises a revision of the genera *Dipholis* and *Bumelia*. Current interpretations of the identity of the older types have in general been accepted, since these are in most cases not now available for study. In accordance with Article 19 of the International Rules of Botanical Nomenclature, names which were not validly published have rigorously been excluded from consideration. My concepts of intraspecific units have been given in a previous paper (Bull. Torrey Club 70: 265. 1943). Although a relatively large amount of material, measured by the standards of tropical botany, has been available for study, I keenly feel its inadequacy in a number of species; my confidence in the accuracy of my taxonomic interpretations varies in approximately direct proportion to the number of specimens seen.

I wish to acknowledge my thanks to Mr. B. A. Krukoff, under whose direction this study was prepared, and to the curators of the several herbaria who have provided essential assistance by kindly loaning specimens for study. The abbreviations used hereinafter to indicate these herbaria are as follows:

- A — Arnold Arboretum, Harvard University.
- CR — Museo Nacional de Costa Rica, San José.
- Cu — Estacion Experimental Agronomica, Habana, Cuba.
- F — Field Museum (Chicago Natural History Museum).
- G — Gray Herbarium, Harvard University.
- Mich — University of Michigan, Ann Arbor.
- Mo — Missouri Botanical Garden, St. Louis.
- NY — New York Botanical Garden.
- PA — Philadelphia Academy of Natural Sciences.
- PR — Tropical Forest Herbarium, U. S. Forest Service, Río Piedras, Puerto Rico.
- US — United States National Herbarium, Washington, D. C.

DIPHOLIS

The genus *Dipholis* was founded in 1844 by Alphonse de Candolle, in the *Prodromus*, vol. 8, p. 188. The single species listed, *D. salicifolia*, necessarily becomes the type. This species has, incidentally, by far the widest distribution of any in the genus, and is biologically as well as nomenclaturally typical. *Dipholis* is antedated six years by *Spondogona* Raf. (*Sylv. Tellur.* 35. 1838), based on *Bumelia pentagona* Sw., which is now

referred to *Dipholis salicifolia* on the authority of Radlkofer (Erg. Mon. Serjania, pp. 55-56. 1886). Swartz described the fruit as 5-angled, and Rafinesque, apparently without seeing the type, enlarged upon this description to say that it was also 5-seeded. A 5-seeded or even 5-angled fruit in *Dipholis salicifolia*, or any other known species of the genus, would be a monstrosity, and any name founded on such a specimen should be rejected under Article 65 of the Rules. I should not hesitate to recommend that *Dipholis* be conserved, were it necessary, but *Spondogona* can be rejected on another basis.

Dipholis is closely related to and evidently derived from *Mastichodendron*,¹ from which it differs primarily in the presence of lateral lobes on the corolla-lobes. Several other usual differences, none entirely constant, are found in the more petaloid staminodes, more nearly basal seed-scar, and frequently smaller leaves and fruit of *Dipholis*, the leaves lacking the deeply channeled midrib and petiolar pouch so commonly found in *Mastichodendron*. One species has been described as lacking the lateral lobes on the corolla-lobes, but in my opinion this species is better referred to *Bumelia*. The relationship and distinctions between *Dipholis* and *Bumelia* are discussed under the latter.

Dipholis is confined to the warmer parts of North America and reaches its greatest development in the Greater Antilles, where 10 of the 14 known species occur. Evolutionary trends in the genus are toward reduction in size of the plant, size of the leaves, size of the fruit, and number of flowers in a cluster, and toward the development of a truly basal seed-scar. The most primitive surviving species, such as *D. Stevensonii* and *D. minutiflora*, are good-sized trees with large leaves, large (2-3 cm.) fruits, numerous flowers in a cluster, and somewhat basilateral seed-scar. These species, particularly *D. Stevensonii*, are not far removed from the generic prototype. *Dipholis nigra* is closely allied to *D. minutiflora*, and may be nearly ancestral to *D. salicifolia*. *Dipholis Jubilla* and, from the description, *D. Bellonis* seem most likely to be related to *D. nigra*. *Dipholis parvifolia* and *D. durifolia* seem to be allied to *D. salicifolia*. The closely related species *D. montana* and *D. octosepala* are probably derived from the *D. nigra-salicifolia* stock. *Dipholis cubensis*, *D. repens*, and *D. ferruginea* form a closely knit group that is related to *D. montana*. *Dipholis sericea* is probably allied to the *D. cubensis* group.

Dipholis A. DC.

Unarmed shrubs or trees; leaves alternate, exstipulate, often small; primary lateral veins not very numerous, sometimes obscure; sepals mostly 5, sometimes 4-9; corolla 5(rarely 6)-lobed, each lobe with a pair of lateral lobes or appendages near its base; staminodes present, more or less petaloid, these and the appendages more or less erose, fimbriate, or lacinate; ovary

¹ The name *Mastichodendron*, as used by Lam (Rec. Trav. Bot. Néerl. 36: 521. 1939), is at this writing not yet validly published. It is intended to validate this name in another paper, publication of which may precede this paper.

glabrous, very rarely shortly appressed-hairy; ovules 5, attached basilaterally; young and mature fruit generally tapering abruptly to the short persistent style; fruit fleshy, mostly 1-seeded, not over about 3 cm. long; seed-scar very nearly basal, rarely evidently basilateral; endosperm well-developed.

KEY TO THE SPECIES

1. Fruit about 2 cm. long; leaves 8–12 cm. long; poorly known plant of Puerto Rico...
..... 5. *D. Bellonis*.
1. Fruit (where known) about 1 cm. long or less, except in some Jamaican and continental species; leaves various.
 2. Inflorescences borne on peduncles up to 15 mm. long, sometimes slightly branched; Oriente, Cuba..... 4. *D. Jubilla*.
 2. Inflorescences sessile, simple.
 3. Flowers numerous, commonly 8 or more in a cluster, generally borne at defoliated nodes, sometimes also in the axils.
 4. Fruit 12–30 mm. long; pedicels 4–15 mm. long; leaves often but not always retuse or rounded; sepals glabrous or hairy.
 5. Leaves densely and loosely rufous-hirsutulous beneath, eventually more or less glabrate; pedicels 10–15 mm. long; petioles 2.5–4 cm. long; sepals strongly and loosely hairy, about 3.5 mm. long or more; British Honduras.
 1. *D. Stevensonii*.
 5. Leaves glabrous or merely sericeous-strigose beneath, the hairs appressed; pedicels 4–10 mm. long; petioles 0.5–2 cm. long; sepals glabrous or with a few appressed hairs, at flowering time less than 2.5 mm. long.
 6. Fruit about 1.5–3 cm. long, yellow to purplish; leaves tardily glabrate beneath, the hairs silvery; continental..... 2. *D. minutiflora*.
 6. Fruit 12–16 mm. long, black; leaves very soon glabrate, the hairs when present often reddish; Jamaica..... 3. *D. nigra*.
 4. Fruit 6–10 mm. long; pedicels 1–4 mm. long; leaves acute or acuminate; sepals distinctly hairy; general distribution..... 6. *D. salicifolia*.
 3. Flowers few, commonly about 1–7 in a cluster, borne in the axils.
 4. Leaves strongly acuminate, closely and conspicuously reticulate-veiny; continental.
 5. Leaves about 6–10 cm. long, borne on petioles about 1.5–2.5 cm. long; pedicels 5–7 mm. long; sepals strongly and rather loosely ferruginous, about 3–4 mm. long; British Honduras..... 7. *D. durifolia*.
 5. Leaves only 2.5–4 cm. long, borne on petioles about 3–7 mm. long; flowers subsessile, the sepals glabrous or slightly strigose, about 2 mm. long; Costa Rica..... 8. *D. parvifolia*.
 4. Leaves mostly obtuse or rounded, if evidently acuminate then not closely and conspicuously reticulate-veiny; Greater Antilles.
 5. Corolla at least 6 mm. long, or if perhaps sometimes not so, then the sepals 8 or 9; sepals commonly but not always more than 5; Jamaica.
 6. Outer 2 sepals essentially glabrous; fruit about 13–18 mm. long; veiny reticulum of the leaves scarcely raised; sepals 5–8..... 9. *D. montana*.
 6. Sepals all hairy; fruit about 1 cm. long or less; veiny reticulum of the leaves evidently raised beneath; sepals 8 or 9..... 10. *D. octosepala*.
 5. Corolla not over 4.5 mm. long; sepals 5, rarely 6; not of Jamaica.
 6. Leaves glabrous, sometimes sparsely hairy when young.
 7. Erect shrubs or trees; leaves 1.5–10 cm. long; Cuba, Hispaniola, and Puerto Rico..... 11. *D. cubensis*.
 7. Creeping or prostrate shrub; leaves 1.5–2 cm. long; Hispaniola..... 12. *D. repens*.
 6. Leaves strongly rufous-sericeous beneath, eventually paler or glabrate; Dominican Republic.

7. Leaves 4-8 cm. long, 1.5-3 cm. wide, eventually glabrate; venation evident, raised..... 13. *D. sericea*.
 7. Leaves 2-4 cm. long, 1-1.5 cm. wide, permanently hairy; venation obscure..... 14. *D. ferruginea*.

1. *Dipholis Stevensonii* Standl. Trop. Woods 11: 21. 1927.

Sideroxylon rufotomentosum Standl. Carnegie Inst. Wash. Misc. Publ. 461(Bot. Maya Area 4): 79. 1935.

Tree up to 25 m. high; leaves elliptic or elliptic-obovate, rounded at the apex, about 10-22 cm. long and 6-12 cm. wide, strongly veiny, the primary lateral veins about 12-16 pairs, raised beneath; leaves densely and loosely hirsutulous-tomentose with rufous hairs at first, soon glabrate above, eventually more or less glabrate beneath; petioles 2.5-4 cm. long; flowers numerous in clusters at defoliated nodes, the pedicels about 10-15 mm. long, rufous-tomentose; mature flowers unknown, but maturing buds 5- or 6-merous, the sepals about 3.5 mm. long or more, the corolla-lobes 2 mm. long, the anthers 1.5 mm. long, the staminodes ovate, scarcely erose, nearly 1.5 mm. long, the lateral appendages narrow, entire or subentire, only 0.5-1 mm. long; fruit ellipsoid, about 16-25 mm. long, resembling that of *Mastichodendron*; seed up to about 16 mm. long, the scar basilateral, ellipsoid, 5 mm. long, the seed-coat about 1 mm. thick.

TYPE COLLECTION: *Stevenson s.n.*, British Honduras, 1927 (F—fragment, US).

LOCAL NAME: *Zapote faisan*.

DISTRIBUTION: British Honduras.

BRITISH HONDURAS: *Lundell* 6200 (F, G, NY, US), 6252 (G, NY, US); *Schipp* S674 (F, G, Mo); *Stevenson s.n.* (1926) (US).

The large veiny leaves, somewhat channeled midrib, relatively long petioles, relatively large fruit, and basilateral rather than basal seed-scar of this species are suggestive of *Mastichodendron*, to which it makes an approach, but the petaloid staminodes and the definite, if smaller than usual, lateral lobes on the corolla-lobes clearly indicate its place in *Dipholis*.

2. *Dipholis minutiflora* Pittier, Contr. U. S. Nat. Herb. 13: 464. 1912.

Sideroxylon Matudai Lundell, Phytologia 1: 221. 1937.

Bumelia tabascensis Lundell, Contr. Univ. Mich. Herb. 5: 22. 1940.

Sideroxylon Steyermarkii Standl. Field Mus. Publ. Bot. 22: 368. 1940.

Dipholis Matudai Lundell, Contr. Univ. Mich. Herb. 7: 43. 1942.

Tree up to 30 m. high; leaves elliptic-ob lanceolate or narrowly elliptic-obovate, rounded to acutish at the apex, tapering to the base, about 6-20 cm. long and 2.5-10 cm. wide, with 10-20 pairs of primary lateral veins, glabrous above, finely white-strigose beneath, eventually glabrate; petioles about 0.5-1.5 cm. long; flowers very numerous in clusters at defoliated nodes, the pedicels slender, nearly glabrous, 5-8 mm. long; sepals 5, glabrous or nearly so at flowering time, about 1.4-2.2 mm. long; corolla about 4.5 mm. long, the 5 lobes 3.5 mm., their lateral appendages lanceolate, acuminate, erose-laciniate, 1.5 mm. long on the inner margin; filaments firm, about 2-2.5 mm. long; anthers about 2 mm. long, sagittate to the middle or beyond; staminodes laciniate, 2.5-3 mm. long; fruit yellow, olive-green, or purplish, ovoid to subglobose, usually conical-acute at the apex, about 1.5-3 cm. long, with thin pulp; seeds about 14-18 mm. long, a little compressed, with broadly ellipsoid basal or basilateral scar 5 mm. long; seed-coat about 0.5 mm. thick.

TYPE COLLECTION: *Tonduz 11935*, forests of El Copey, Dota Mountains, Costa Rica, about 1800 m., February, 1898 (NY, US).

LOCAL NAMES: *Sapote prieto, nispero*.

DISTRIBUTION: State of Mexico, Mexico, to the Panama Canal Zone.

MEXICO: Mexico: *Hinton 4923* (G), 7700 (G). Guerrero: *Hinton 10416* (G). Tabasco: *Matuda 3455* (Mich, NY). Chiapas: *Matuda 571* (A, Mo, US), 4175 (A, F, NY). GUATEMALA: San Marcos: *Steyermark 37615* (F). Quezaltenango: *Steyermark 33858* (F). Suchitepéquez: *Steyermark 35409* (F). HONDURAS: Comayagua: *Edwards P-302* (A, F). Yoro: *von Hagen 1007* (F, NY). COSTA RICA: *Austin Smith 4184* (F); *Standley & Valerio 46505* (A, US), 46481 (US). PANAMA: Chiriquí: *Allen 1564* (F, G); *White 109b* (F, G); *Woodson, Allen & Seibert 995* (A, F). Canal Zone: *Allen 1314* (F, G, US).

3. *Dipholis nigra* (Sw.) Griseb. Fl. Brit. W. Ind. 400. 1861.

Bumelia nigra Sw. Prodr. 49. 1788.

Achras nigra Poir. in Lam. Encyc. Meth. 6: 532. 1804.

Dipholis nigra var. *brachyphylla* Urb. Symb. Ant. 5: 137. 1904.

Tree up to 15 m. tall; leaves elliptic or narrowly elliptic-ovate, commonly acute or acutish, sometimes obtuse or bluntly acuminate, glabrous, veiny, with evident reticulum, commonly 6–18 cm. long, 3–6.5 cm. wide, the petioles 1.5–3 cm. long; flowers numerous in clusters at defoliated nodes, the pedicels about 4–10 mm. long, essentially glabrous; sepals essentially glabrous, about 1.5–2 mm. long; corolla about 3.9–4.4 mm. long, the tube 1.1–1.5 mm.; corolla-lobes cordate-auriculate above the lateral lobes, which are shorter and broader than those of *D. salicifolia*; filaments up to 3 mm. long, stout, except for the tenuous tip, as in *D. salicifolia*; anthers about 1.4–1.8 mm. long, more evidently sagittate than in *D. salicifolia*; stamnodes ovate, petaloid, erose, about 2 mm. long or more; style 1 mm. long or less, conical; fruit black, ellipsoid to ovoid-globose, 12–16 mm. long, up to 12 mm. thick.

TYPE COLLECTION: None given; reference to Browne, Hist. Jam. 201. 1756.

LOCAL NAME: *Red bullet or bully*.

DISTRIBUTION: Jamaica; reported, probably incorrectly, from Cuba.

JAMAICA: *Alexander s.n.* (1850) (G, US); *Britton 1105* (NY), 3688 (NY); *Harris 5388* (A, G, NY, US); *Miller 1389* (US); *Rehder s.n.* (Feb. 13, 1903) (A); *Hart 1057* (US); *Taylor 220* (NY).

4. *Dipholis Jubilla* Ekm. ex Urb. Symb. Ant. 9: 415. 1925.

Tree; leaves lanceolate or elliptic, glabrous nearly from the first, commonly 5–15 cm. long, 2–5.5 cm. wide, acute or acuminate, the primary lateral veins evident beneath, the secondary ones obscure, not forming an evident reticulum; petioles about 1–2.5 cm. long; flower-clusters borne on peduncles up to 15 mm. long, the inflorescence sometimes slightly branching; pedicels about 2–3 mm. long, finely ferruginous; sepals finely and sparsely ferruginous, 2.5 mm. long in bud; mature flowers and fruit unknown.

TYPE COLLECTION: *Ekman 8324*, "ad Alto de Iberia in cacumine montis cr. 1135 m." November 12, 1916 (A, F, NY).

LOCAL NAMES: *Jubilla, juba prieto*.

DISTRIBUTION: Oriente, Cuba.

CUBA: Oriente: *Ekman 4249* (G, NY), 5574 (US), 9369 (NY), 15659 (G, US); *León 19877* (NY); *Roig 5316* (Cu), 6209 (Cu, NY).

The leaves of *D. Jubilla* are somewhat similar to those of *D. nigra*, but may be distinguished by the lack of an evident veiny reticulum.

5. *Dipholis Bellonis* Urb. Symb. Ant. 5: 137. 1904.

Leaves 8–12 cm. long, 2.5–4 cm. wide, ovate-oblong, acute at the base, acuminate at the apex, borne on petioles 1–2 cm. long; fruiting pedicels 10–15 mm. long; fruit obovoid, sometimes narrowly so, 18–20 mm. long, 10–15 mm. thick, violet-blackish. (Description taken from the original; no specimens seen.)

TYPE COLLECTION: *Bello*, near Furnias, Puerto Rico.

LOCAL NAME: *Varital*.

DISTRIBUTION: Known only from the type collection, Puerto Rico.

6. *Dipholis salicifolia* (L.) A. DC. in DC. Prodr. 8: 188. 1844.

Achras salicifolia L. Sp. Pl. ed. 2. 1: 470. 1762.

Bumelia salicifolia Sw. Prodr. 50. 1788.

Bumelia pentagona Sw. loc. cit.

Sideroxylon pauciflorum Lam. Tab. Encyc. 2: 42. no. 2459. 1793.

Achras pentagona Poir. in Lam. Encyc. Meth. 6: 533. 1804.

Sideroxylon salicifolium Gaertn. f. Carp. Suppl. 124. t. 202. 1805.

Spondogona nitida Raf. Sylv. Tellur. 35. 1838.

Sideroxylon pentagonum A. DC. in DC. Prodr. 8: 185. 1844.

Dipholis salicifolia var. *jamaicensis* Pierre in Urb. Symb. Ant. 5: 139. 1904.

Spondogona salicifolia House, Am. Midl. Nat. 7: 131. 1921.

?*Dipholis leptopoda* Urb. Ark. Bot. 22A(17): 70. 1929.

Large shrub, or more commonly a tree, sometimes nearly 25 m. high; leaves narrowly elliptic to elliptic-lanceolate or elliptic-ob lanceolate, acute or acuminate at both ends, commonly 5–11 cm. long and 1.5–4 cm. wide, villosulous when young, but very soon glabrate, the petioles short, commonly 0.5–1.5 cm. long; flowers numerous in clusters at defoliated nodes or sometimes in the axils, the pedicels finely sericeous, about 1–4 mm. long; sepals finely hairy, about 1.4–3 mm. long; corolla about 3.3–4.5 mm. long, the tube 1.3–1.6 mm.; corolla-lobes rounded, elliptic, narrowed to a short claw-like base above the lateral lobes or appendages, which are acute or acuminate, lanceolate or ovate; staminodes ovate or broadly elliptic, petaloid, about 1.5–2 mm. long, more or less erose-laciniate; filaments about 1.5–2.5 mm. long, very stout and firm except for the short abruptly tenuous distal portion; anthers about 0.9–1.6 mm. long, exserted; ovary 5-loculate, glabrous or rarely slightly hairy, the style 1.5–2.5 mm. long; fruit black, with thin pericarp, broadly ellipsoid or subglobose, about 6–10 mm. long, with 1 or sometimes 2 or 3 seeds; seed-scar basal, circular or elliptic, 1 mm. in greatest diameter; seed-coat about 0.2–0.3 mm. thick, light to dark brown.

TYPE COLLECTION: None given; references to works of Sloane and Browne on Jamaica

LOCAL NAMES: *White bullet* or *bully*, *mijico*; for many others see Symb. Ant. 5: 138. 1904.

DISTRIBUTION: Southern Florida; Bahama Islands; Greater Antilles; Virgin Islands, and sparingly through the Lesser Antilles to Guadeloupe and the Barbados Islands; southern Mexico, Guatemala, and British Honduras. Specimens from Florida are so numerous that I have cited only a small proportion of them.

U.S.A.: Florida: *Curtiss* 1760 (A, NY, US), 5859 (NY, US); *Duckett* 223 (A, F, NY, US); *Moldenke* 750 (NY, US), 5701 (NY); *Pollard et al.* 197 (NY, US);

Small & Mosier 5509 (NY), 5652 (NY), 5760 (NY), 6553 (NY), 6591 (NY, US); *Tracy* 9252 (NY, US). BAHAMAS: *Brace* 3893 (NY, US), 4620 (NY), 4932 (NY), 6737 (NY); *Britton* 10 (NY, US), 112 (NY), 3376 (G, US), 6434 (NY, US); *Britton & Brace* 188 (NY); *Britton & Millspaugh* 2579 (NY), 5610 (NY); *Coker* 257 (NY), 395 (NY); *Cooper* 3 (NY); *Curtiss* 148 (A, G, NY, US); *Earle* 50 (NY); *Eggers* 4106 (F, NY, US); *Northrop* 326 (A, F, G, NY); *Small & Carter* 8459 (G, NY, US); *Wight* 143 (G, NY), 1905 (F); *Wilson* 7438 (G, NY), 7725 (G, NY), 8172 (NY), 8287 (NY), 8422 (NY). CUBA: *Isla de Pinos*: *Britton, Wilson & León* 15270 (G, NY, US). *Habana*: *León* 8524 (NY), 10674 (NY); *León & Edmund* 8764 (NY). *Matanzas*: *Britton & Wilson* 14045 (US). *Santa Clara*: *Britton, Earle & Wilson* 5888 (NY, US); *Britton & Wilson* 5527 (NY); *Ekman* 18353 (A); *Jack* 4215 (A), 4351 (A), 4808 (A, US), 5608 (A, US), 5661 (A), 5675 (A, US), 6015 (A, US); *León* 398 (NY); *Rehder* 1119 (A); *Shafer* 12310 (NY, US). *Camaguey*: *Shafer* 436 (NY), 677 (G, NY, US), 934 (G, NY, US), 1045 (G, NY, US). *Oriente*: *Britton* 1875 (NY); *Britton & Cowell* 12613 (NY, US); *Britton, Cowell & Shafer* 13065 (NY, US); *Ekman* 4629 (G, US), 4804 (A, F, US), 7715 (NY), 8596 (F, G); *Shafer* 1313 (NY), 1503 (NY, US); *Wright* 1325 (G, NY, US). JAMAICA: *Alexander* s.n. (1850) (NY, US); *Britton* 1887 (NY), 1949 (NY); *March* s.n. (NY); *Eggers* 3509 (A, US); *Hansen* s.n. (1897) (A, F, US); *Harris* 5511 (NY), 7070 (NY), 8642 (NY), 8949 (NY), 9616 (NY, US), 10170 (NY, US), 10806 (NY, US); *Hart* 611 (NY); *Miller* 1363 (US), 1413 (US); *Perkins* 1264 (G); *Rothrock* 141 (NY), 231 (F). HAITI: *Holdridge* 987 (US); *Leonard* 3204 (G, NY, US), 8870 (G, NY, US), 12376 (A, G, US), 14850 (NY, US), 15743 (A, G, NY, US). DOMINICAN REPUBLIC: *Abbot* 1295 (G, US), 2248 (G, US), 2867 (G, US); *Ekman* 14380 (US); *Fuertes* 210 (A, G, NY, US); *Rose, Fitch & Russell* 4233 (A, G, NY, US); *Scarf* 2a (F); *Wright* et al. 305 (F). PUERTO RICO: *Britton & Brown* 6367 (NY); *Britton & Marble* 2333 (NY, US); *Holdridge* 321 (PR); *Johnston* 909 (NY), 1862 (NY); *Sargent* 438 (US); *Shafer* 2761 (NY, US); *Sintenis* 733 (G), 733b (NY, US), 3640 (G, NY, US); *Stevenson* 1862 (A, US). ST. JOHN: *Holdridge* 132 (NY). TORTOLA: *Fishlock* 401 (A, F, G, NY, US), 402 (A). ST. CROIX: *Thompson* 759 (NY). ST. EUSTATIUS: *Boldingh* 1168 (NY). GUADELOUPE: *Duss* 2913 (A, F, G, NY, US); *Stehlé* 2870 (US). MARIE GALANTE: *Stehlé* 420 (NY). BARBADOS: *Bovell* 468 (NY). ST. ANDREW (Barbados): *Bovell & Freeman* 374 (NY). MEXICO: *Vera Cruz*: *Gaumer* 2150 (G); *Purpus* 2031 (NY, US). PUEBLA: *Purpus* 3382 (F, US). CAMPECHE: *Lundell* 1346 (F, NY, US). YUCATÁN: *Flores* s.n. (1936) (F); *Gaumer* s.n. (1888) (F), 1047 (A, F, G, US), 2150 (A, F, US), 23516 (A, F, G, US), 23632 (A, F, G, US); *Lundell* 7557 (A); *Seler* 3993 (A, F, G, US). GUATEMALA: *El Petén*: *Bartlett* 12679 (A, F, NY, US); *Lundell* 3058 (F, G, US), 3098 (F), 3197 (F), 3354 (A), 3690 (F). BRITISH HONDURAS: *Karling* s.n. (1931) (A, F, US); *Lundell* 3895 (F); *Schipp* S-650 (A, F, G, NY).

Dipholis leptopoda Urb. & Ekm. was based on some immature specimens which have unusually few flowers for *D. salicifolia*, but which do not seem to belong anywhere else. The leaves are also broader and more obtuse than is general for the species, and it may eventually prove to be distinct.

7. *Dipholis durifolia* Standl. Carnegie Inst. Wash. Misc. Publ. 461 (Bot. Maya Area 4): 78. 1935.

Tree 6 m. high; leaves lanceolate, strongly acuminate, 6–10 cm. long, 1.5–2.5 cm. wide, quite glabrous at least at maturity, conspicuously and finely reticulate-veiny on both sides; petioles about 1.5–2.5 cm. long; flowers 1–6 in the axils, the stout ferruginous pedicels 5–7 mm. long; sepals strongly ferruginous, about 3.2–4 mm. long; corolla about 5 mm. long or more, the tube about equaling the lobes; staminodes petaloid, ovate, erose, about 2–2.5 mm. long; ovary glabrous, 5-celled, its style about 2–2.5 mm. long; fruit unknown.

TYPE COLLECTION: *Schipp* 1202, bare hilltop, Jacinte Hills, British Honduras, 700 feet, September 8, 1933 (A, F, G, NY).

DISTRIBUTION: Known only from the type collection, British Honduras.

This species and *D. parvifolia* are evidently closely related; their relationship to other species in the genus is uncertain, but *D. salicifolia* may be suggested as the nearest relative.

8. *Dipholis parvifolia* Standl. *Field Mus. Publ. Bot.* 18: 909. 1938.

Tree; leaves elliptic-lanceolate, long-acuminate, 2.5–4.5 cm. long, 1–1.5 cm. wide, glabrous, firm, closely and conspicuously reticulate-veiny on both sides, but the veins not much raised; petioles 3–7 mm. long; flowers borne singly or in very small groups in the axils, nearly sessile, the sepals about 2 mm. long, sparsely strigose or glabrous; fruit obovoid, about 17 mm. long.

TYPE COLLECTION: *Standley & Valerio* 45525, wet forest, Los Ayotes, near Tilarán, Guanacaste, Costa Rica, 600–700 m., January 21, 1926 (US).

DISTRIBUTION: Known only from the type collection, Guanacaste, Costa Rica.

9. *Dipholis montana* (Sw.) Griseb. *Fl. Brit. W. Ind.* 401. 1861.

Bumelia montana Sw. *Prodri.* 49. 1788.

Achras montana Poir. in Lam. *Encyc. Meth.* 6: 533. 1804.

Dipholis pallens Pierre & Urb. in Urb. *Symb. Ant.* 5: 136. 1904.

Dipholis lanceolata Pierre in Urb. *Symb. Ant.* 5: 136. 1904.

Shrub or small tree sometimes as much as 15 m. high; leaves elliptic to broadly or narrowly obovate, broadest at or generally above the middle, commonly 3–11 cm. long, 2–5.5 cm. wide, obtuse to abruptly short-acuminate, glabrous, veiny, but the reticulum scarcely raised; petioles about 3–10 mm. long; flowers in axillary clusters of about 2–7, the stout pedicels thinly strigose, 2–6 mm. long, elongating in fruit; sepals 5–8, the 2 outer glabrous or sparingly strigose, generally shorter than the others, about 2–4 mm. long, the inner evidently though finely sericeous-strigose, commonly 3–4 mm. long; corolla about 6.3 mm. long, the tube and bases of the staminodes thick and firm, the lobes and their appendages thin; corolla-tube about 3.2 mm. long or more; filaments about 1.5 mm. long or a little less, stout, tapering from the base; anthers about 0.8–1.1 mm. long; staminodes orbicular-obovate, about 1.5 mm. long, fimbriate, thickened toward the base; style about 1–2 mm. long, the stigma slightly expanded; ovary 5-loculate; fruit ellipsoid or ellipsoid-ovate, about 13–18 mm. long, 9–12 mm. thick; seed (from fruit 18 mm. long) 13 mm. long, 10 mm. thick, with basal or elliptic scar 3.5 mm. long; seed-coat dark brown, 0.4–0.6 mm. thick.

TYPE COLLECTION: None given.

LOCAL NAMES: *White bullet* or *bully*, *black bullet* or *bully*.

DISTRIBUTION: Jamaica.

JAMAICA: *Britton* 270 (NY), 1107 (NY); *Harris* 5340 (NY), 5355 (NY), 5370 (A, G, NY), 5704 (A, F, US), 5777 (NY), 6691 (A, NY, US), 6731 (NY, US), 9742 (NY, US), 9803 (NY, US), 10118 (NY, US), 10807 (A, G, NY, US); *Hart* 533 (US), 642 (F, US); *Miller* 1267 (US), 1297 (US); *Shreve* s.n. (May 16, 1906) (NY).

10. *Dipholis octosepala* Urb. *Symb. Ant.* 7: 324. 1912.

Tree up to 10 m. high; leaves rufous-tomentulose when young, later glabrate, elliptic to ovate or obovate, 9–12 cm. long, 4–6 cm. wide, obtuse to acuminate, the veins obscure above, raised and forming an evident retic-

ulum beneath; petioles 1.5–2.5 cm. long; flowers about 2–4 in the axils, the stout pedicels up to 5 mm. long, rufous-hairy; sepals about 8 or 9, spiraled, all finely and loosely rufous-hairy, about 3–4 mm. long; mature corolla unknown; lateral appendages of the corolla-lobes erose-laciniate; staminodia well developed, fimbriate; fruit ellipsoid or subglobose, about 1 cm. long or a little less, with 1 or 2 seeds; seed-coat about 0.3 mm. thick.

TYPE COLLECTION: *Harris 10986*, "ultra Clarendon in sylvis Peckham dictis," July, Jamaica (NY).

DISTRIBUTION: Jamaica, all of the collections from the same station.

JAMAICA: *Harris 11049* (NY), *12798* (NY, US).

In its few-flowered clusters, stout pedicels, and numerous sepals, this species resembles *D. montana*, but differs in having all the sepals loosely hairy, in having a smaller fruit, and in the differently shaped thicker leaves with longer petioles and with raised veiny reticulum beneath.

11. *Dipholis cubensis* (Griseb.) Pierre in Urb. *Symb. Ant.* 5: 140. 1904.

Bumelia cubensis Griseb. *Cat. Pl. Cub.* 164. 1866.

Dipholis cubensis var. *oblongata* Pierre in Urb. *Symb. Ant.* 5: 140. 1904.

Dipholis dominicensis Pierre & Urb. in Urb. *Symb. Ant.* 5: 140. 1904.

Dipholis Sintenisiana Pierre in Urb. *Symb. Ant.* 5: 139. 1904.

Dipholis angustifolia Urb. *Symb. Ant.* 7: 323. 1912.

Dipholis Ekmaniana Urb. *Symb. Ant.* 9: 416. 1925.

Much-branched shrub or small tree up to 10 m. tall; leaves firm, glabrous, oblanceolate to obovate or elliptic, acute at the base, rounded to acutish at the apex, about 2–10 cm. long and 6–30 mm. wide; petioles 2–10 mm. long; flowers about 1–4 in a cluster, the pedicels 2–20 mm. long, glabrous or hairy; sepals about 1.8–2.5 mm. long, glabrous or strigose; corolla about 2.7–3.7 mm. long, the lobes a little shorter than the tube, which sometimes bears scattered long red hairs; filaments about 0.5–1.6 mm. long; anthers about 0.8 mm. long; staminodes petaloid, erose or laciniate, less than 1 mm. long; style short and stout, about 0.4–0.7 mm. long; fruit purple or reddish, or perhaps sometimes green, about 5–13 mm. long and 3–7 mm. thick, oliviform-ellipsoid to ovoid; seed-scar basal, a little over 1 mm. wide; seed-coat about 0.4 mm. thick.

TYPE COLLECTION: *Wright 2921*, near Monteverde, Oriente, Cuba (G, Mo, NY, US — drawing).

DISTRIBUTION: Pinar del Río and Oriente, Cuba, to Hispaniola and Puerto Rico.

CUBA: *Wright 1326* (G), *1327* (G). Pinar del Río: *Ekman 17527* (NY, US); *León 13200* (NY), *13837* (NY). Oriente: *Ekman 2296* (NY, US), *2713* (F), *5562* (G), *6017* (NY), *9330* (NY, US), *9407* (NY, US), *9886* (US), *10008* (NY), *14326* (A, F, G, US); *León 10828* (NY), *11959* (NY); *León et al. 10210* (NY); *Roig 47* (NY), *6550* (Cu); *Shafer 3033* (NY), *3461* (NY, US), *3563* (NY, US), *3801* (NY, US); *Wright 1637* (F, G). HAITI: *Buch 1857* (US), *1923* (US); *Cook, Scofield & Doyle 26* (US); *Ekman H9420* (US), *H10594* (US), *H1875* (US); *Holdridge 1384* (US); *Leonard 7591* (US), *8069* (US), *8387* (G, NY, US), *9545* (US), *13242* (NY, US), *13430* (NY, US), *13488* (A, US), *13489* (G), *14845* (US), *14867* (US), *15017* (US); *Nash 722* (NY), *822* (NY), *840* (NY); *Nash & Taylor 1415* (NY, US). DOMINICAN REPUBLIC: *Ekman H11079* (US), *H13707* (US), *H13846* (US), *H15405* (US); *Fuertes 362* (A, G, NY, US), *577* (A), *1831* (A, NY); *Valeur 459* (A, US), *804* (A, NY, US). PUERTO RICO: *Britton 7836* (NY); *Britton & Hess 2559* (NY, US); *Gerhart 321* (NY); *Gregory 388* (PR); *Sintenis 183* (G, NY, US).

There is considerable variation within this species in size and shape of

the fruit, length of the pedicels, and distribution of the leaves, and at first I thought that several species, bolstered by geography, might be recognized on these bases. It now seems plain, however, that these characters are unstable, and that only one species is involved. It is possible that the plants from Hispaniola should be distinguished intraspecifically, from those of Cuba, on the basis of the usually smaller and less firm leaves, which tend to be well distributed along the twigs, instead of clustered at the ends. The Puerto Rican plants, however, have the leaves clustered at the ends of the twigs, like those from Cuba, while retaining the texture of those from Hispaniola.

12. *Dipholis repens* Urb. & Ekm. *Ark. Bot.* 22A(17): 70. 1929.

Creeping or prostrate shrub; leaves obovate or oblong-obovate, 1.5–2 cm. long, 6–11 mm. wide, or the upper smaller, acute at the base, rounded at the apex, glabrous except when very young; petioles 2–3 mm. long; flowers 1 or 2 in the axils, the pedicels 1–3 mm. long; sepals 5, the 2 outer glabrous, 1.5 mm. long, the 3 inner appressed-hairy, 2 mm. long; corolla white, fragrant, 4 mm. long, the lobes surpassing the tube; filaments scarcely 1 mm. long; style 1 mm. long; fruit brown-purple, obovate-oblong or ellipsoid, 5–6 mm. long, 3.5–4 mm. thick, 1-seeded. (Description abstracted from the original; no specimens seen.)

TYPE COLLECTION: *Ekman H6790*, "Cordillera de Bahoruco in Sierra de los Comisarios in pinetis ultra 1700 m. alt.," August, Barahona, Dominican Republic (US).

DISTRIBUTION: Haiti and the Dominican Republic.

This species is obviously related to *D. cubensis*, but differs in its creeping habit and smaller leaves.

13. *Dipholis sericea* sp. nov.

Planta lignosa; foliis firmiter chartaceis oblanceolatis vel anguste ellipticis, circiter 4–9 cm. longis et 1.5–3 cm. latis, apice rotundatis vel abrupte et breviter acuminatis, subtus primo rufo-sericeis demum glabratis, nervis lateralibus primariis et minus secundariis subtus elevatis perspicuisque, rete venularum laxo; petiolis circiter 3–8 mm. longis; floribus in axillis 1–4, pedicellis crassis ferrugineis circiter 2–4 mm. longis; sepalis plerumque 6 interdum 4, subtiliter et interdum sparse ferrugineis, late et valde imbricatis, circiter 3.5–3.7 mm. longis vel extimo plerumque manifeste breviore; corolla (in alabastro tantum visa) cum appendicibus fimbriatis staminodiisque cito caduca; ovario glabro in stylum 2 mm. longum abrupte contracto; fructu ignoto.

TYPE: *Ekman H14261*, Cordillera Central, prov. Santo Domingo, Villa Altagracia, top of Loma Marian Chicle, mossy thicket, about 825 m., Dominican Republic, January 6, 1930 (US).

DISTRIBUTION: Known only from the type collection, Dominican Republic.

Although mature flowers of *D. ferruginea* are not yet available, maturing buds indicate that its flowers are significantly smaller than those of *D. sericea*. The leaves of the two species differ conspicuously in size, shape, and venation.

14. *Dipholis ferruginea* Ekm. & Schmidt, *Rep. Sp. Nov.* 32: 94. 1933.

Large tree; leaves firm, narrowly elliptic, oblong, rounded at the apex,

2-4 cm. long, 1-1.5 cm. wide, glabrous, shining above, densely sericeous beneath, the hairs at first strongly rufous, later pale; petioles about 2.5 mm. long; flowers mostly 1 or 2 in the axils, the pedicels less than 6 mm. long, densely rufous-hairy.

TYPE COLLECTION: *Ekman H15406*, "Cordillera Central, prov. de Samana, Los Haitises, Boca del Infierno," limestone crags, light forest, characteristic, June 24, 1930, Dominican Republic (US).

DISTRIBUTION: Known only from the type collection, Dominican Republic, but reported by the collector to be very common.

BUMELIA

The genus *Bumelia* was described in 1788 by Swartz, in his *Prod. Veg. Ind. Occ.*, p. 49. Of the seven species there included, four have been removed to *Dipholis* and one to *Mastichodendron*, leaving only *B. rotundifolia* and *B. retusa*. *Bumelia retusa*, being the more common and widespread of the two, may well stand as the nomenclatural type of the genus. *Bumelia* is antedated 11 years by *Robertia* Scop., but it has been conserved by an international botanical congress. Otto Kuntze rejected *Bumelia* in favor of *Lycoïdes* L. (1738), but, since he gave neither descriptions nor references to descriptions for his numerous transfers (other than *L. spinosum*), his names are not validly published and are here ignored. Rafinesque proposed for *B. tenax* a new genus *Sclerocladus*, which he later modified to *Sclerozus*, but this has universally and correctly been reduced to synonymy.

In 1923 Lecomte described a new species, *Bumelia Harmandii*, from Indo-China (Bull. Mus. Nat. Hist. Par. 29: 179). Its floral and vegetative characters would seem from the description to be wholly consonant with *Bumelia*, although the leaves are somewhat larger than those of any other known species of the genus. In the absence of fruits, its true generic position is uncertain. The genus *Bumelia* is otherwise strictly American.

Bumelia is related to and evidently derived from *Dipholis*, from which it differs primarily in the absence of endosperm. The differences between the two genera may be tabulated as follows:

BUMELIA	DIPHOLIS
Seeds without endosperm; cotyledons fleshy.	Seeds with endosperm; cotyledons thin.
Ovary usually hairy, occasionally glabrous.	Ovary nearly always glabrous.
Plant commonly spiny or thorny.	Plant unarmed.
Young and mature fruit commonly broadly rounded to subtruncate or even retuse at the apex.	Young and mature fruit commonly abruptly tapering to the style.
Lateral lobes of the corolla-lobes sometimes wanting.	Lateral lobes of the corolla-lobes always present.
Well-developed on the continent as well as in the West Indies.	Principal development in the Greater Antilles.

According to Record (Trop. Woods 59: 33. 1939) there is also some difference in the wood-anatomy.

Although *Bumelia* and *Dipholis* have almost universally been considered

distinct, they were united by Baehni in his survey of the family (Candollea 7: 394-508. 1938). In that and subsequent works Baehni denies the significance of endosperm, pointing out that there are cases where the character is known to fail. All other characters in the family also fail on occasion, however, including the type of seed-scar, on which Baehni founds his subfamilies. The fact is that students of the group have repeatedly noted that the presence or absence of endosperm runs parallel to natural groupings which are otherwise discernible, and this is also the case with *Dipholis* and *Bumelia*. It is not ordinarily necessary to dissect a mature seed to distinguish between the two genera. Baehni's objection to the endosperm character seems also to be founded on the practical difficulties in determining its presence in herbarium specimens, a view with which I can sympathize but not agree.

Bumelia has a considerable number of widespread and highly variable species, and specific lines must frequently be drawn rather broadly. Even then constant tangible characters are all too few, although I have seen very little evidence of hybridization. Length of the pedicels has frequently been used as a specific character, but, except in certain cases of subsessile versus evidently pedicellate flowers, it appears to be of very little value. There is a great deal of variation in pubescence, and many species have been founded on pubescence characters. It is true that the kind and color of the pubescence are very helpful in delimiting the entities, but there is a strong tendency for the hairs to fade and fall off progressively with advancing maturity, so that the young leaves and twigs may be very different in appearance from more mature ones.

The species which occur in the United States have recently been revised by Clark (Ann. Mo. Bot. Gard. 29: 155-182. 1942), who recognized 14 species and several additional varieties. My observations as to the constancy of certain characters, such as the variegation of the seeds in several species, the glabrous ovary in *B. reclinata*, and the entire versus erose corolla-lobes in "*B. texana*" and related entities, are quite contrary to Clark's. I am able to recognize only 5 species in the United States; Asa Gray's treatment in the second edition of the Synoptical Flora is reasonably adequate to distinguish these. Not a single valid species of *Bumelia* seems to have been described from the United States since the appearance of Michaux's flora in 1803. Since Clark cites numerous specimens, and his entities are in general readily equated with mine, I am not citing specimens for the 5 species concerned. In general, all other specimens from outside the United States are cited, except those which belong to widespread species and bear incomplete data.

The most primitive surviving species of the genus is *B. persimilis*. The general similarity of this species to *Dipholis salicifolia* has several times been remarked, and it seems not to be accidental. *Bumelia persimilis* may very well be only slightly removed from the prototype of the genus. Evolutionary trends are toward reduction in size of the whole plant, in size of the leaves and prominence of their veiny reticulum, in size of fruits, and

sometimes in the number of flowers in a cluster. I have found the construction of a satisfactory key more than ordinarily difficult. The one here presented follows the natural lines as nearly as possible, at the expense, in some cases, of serviceability in identification.

Bumelia Sw.

Shrubs or trees, commonly but not always spiny; leaves alternate or casually opposite, exstipulate, often small; primary lateral veins not very numerous, sometimes obscure; flowers mostly 5-merous throughout, sometimes casually 4- or 6-merous; corolla-lobes each with a pair of lateral lobes or appendages at the base, or these sometimes suppressed; staminodes present, petaloid, entire to erose or laciniate; ovary usually more or less hairy, sometimes glabrous; ovules solitary in the locules, ordinarily 5, attached basilaterally; young and mature fruit generally broadly rounded or subtruncate to even retuse at the apex; fruit fleshy, mostly 1-seeded, not over about 2.5 cm. long; seed-scar small, nearly basal; endosperm wanting.

KEY TO THE SPECIES

1. Corolla-lobes with lateral appendages (except rarely in South American *B. obtusifolia*).
 2. Fruit large, about 1.5-2.5 cm. long; Mexico to Venezuela.
 3. Fruit smooth, not gall-like; pubescence various.
 4. Leaves large, the larger mostly 5-12 cm. long; primary lateral veins about 10-30 pairs.
 5. Petioles mostly 2-10 mm. long; style 3-7 mm. long; leaves variable in pubescence, but not finely sericeous-strigose with tardily deciduous gray-white hairs beneath; sepals hairy or sometimes glabrous; Mexico to Venezuela.....1. *B. persimilis*.
 5. Petioles mostly 10-20 mm. long; style mostly 2-3 (rarely 4) mm. long; leaves finely sericeous-strigose with tardily deciduous gray-white hairs beneath; sepals glabrous; Mexico only.....2. *B. laetevirens*.
 4. Leaves smaller, about 2-4.5 cm. long; primary lateral veins about 4-10 pairs; Queretaro, Mexico.....3. *B. Altamiranoi*.
 3. Fruit gall-like, covered with short densely rufous-tomentose processes; twigs and lower leaf-surfaces finely velutinous-tomentose, at least when young; Oaxaca, Mexico.....4. *B. eriocarpa*.
 2. Fruit smaller, about 6-15 mm. long.
 3. Leaves closely and conspicuously reticulate-veiny, the veins evidently raised; style short, about 0.8-2 mm. long; species of the United States and northeastern Mexico.
 4. Leaves either loosely woolly beneath or soon glabrate, the reticulum evident on both sides.
 5. Fruit 7-15 mm. long; ovary always hairy; Florida to Missouri, Arizona, and Mexico.
 6. Leaves loosely woolly-villous beneath (soon subglabrate in some chiefly far western forms), variable in size.....5. *B. lanuginosa*.
 6. Leaves finely silvery-strigose or -sericeous beneath when young, soon glabrate, the larger commonly 4-13 cm. long; extending west only to eastern Texas.....6. *B. lycioides*.
 5. Fruit 4-7 mm. long; ovary often glabrous; leaves loosely hairy beneath when young, soon glabrate, the larger ones mostly 1.5-4.5 cm. long; Florida.....7. *B. reclinata*.
 4. Leaves sericeous-tomentose beneath with usually tawny or rufous hairs, sometimes becoming merely sericeous-strigose in age, but only very rarely

glabrate, the pubescence obscuring the reticulum of the lower leaf-surfaces; South Carolina to Florida.....8. *B. tenax*.

3. Leaves not conspicuously reticulate, or, if occasionally so, then the style more than 2 mm. long; species, except *B. celastrina*, not of the United States and northeastern Mexico.

4. Leaves not fascicled, except rarely on older branches.

5. Leaves smooth or more or less veiny, not finely reticulate-striate, nor with a peculiar texture; general distribution, except Hispaniola, Puerto Rico, and the Lesser Antilles.

6. Leaves essentially glabrous from the first; Jamaica.....10. *B. rotundifolia*.

6. Leaves more or less pubescent, at least when young.

7. Pubescence of the leaves gray, or in South American forms often slightly tawny; southern Mexico to Argentina.....9. *B. obtusifolia*.

7. Pubescence of the leaves strongly rufous, at least when young.

8. Leaves sericeous beneath, tardily glabrate; Bahamas, Cuba, Navassa, Jamaica, and along the mainland coast from southern Vera Cruz to British Honduras.....11. *B. retusa*.

8. Leaves merely strigose beneath, generally soon glabrate; San Luis Potosí to Guerrero, west to Baja California; Socorro.

9. Leaves relatively large, about 4-8 cm. long; Socorro Island.....12. *B. socorrensis*.

9. Leaves smaller, about 2-4.5 (or in *B. verruculosa* 5.5) cm. long; mainland.

10. Staminodia not all hooded; sepals not at all cartilaginous at the base; flowers relatively large, the corolla about 7.5 mm. long, the anthers 2.5-2.7 mm.; Baja California.....13. *B. peninsularis*.

10. Staminodia more or less hooded; sepals cartilaginous at the base; flowers relatively small, the corolla about 4.5-5 mm. long, the anthers about 1.6-2 mm. long; Sinaloa and San Luis Potosí to Guerrero.

11. Staminodia glabrous, laciniate-margined; twigs soon glabrate, not verruculose; Sinaloa to Guerrero.....14. *B. cartilaginea*.

11. Staminodia villous, entire-margined; twigs soon becoming verruculose with the persistent firm bases of the hairs; San Luis Potosí.....15. *B. verruculosa*.

5. Leaves with a peculiar texture, due largely to the very fine reticulated striations trending parallel to the primary lateral veins, not otherwise reticulate; Hispaniola, Puerto Rico, Lesser Antilles, northern Venezuela, and coastal islands.....16. *B. obovata*.

4. Leaves fascicled, or occasionally not so on vigorous young shoots of *B. celastrina*.

5. Leaves with a peculiar texture, due largely to the very fine reticulated striations trending parallel to the primary lateral veins, not otherwise reticulate; Hispaniola, Puerto Rico, Lesser Antilles, northern Venezuela, and coastal islands.....16. *B. obovata*.

5. Leaves not with such a texture, not finely reticulate-striate; general distribution, except Puerto Rico and the Lesser Antilles.

6. Fruit dark red, subglobose, less than 1 cm. long; hairs of the leaves and twigs rufous, at least when young; Cuba and Hispaniola.....17. *B. glomerata*.

6. Fruit blue-black, ellipsoid-cylindric, about 7-15 mm. long; hairs of the leaves and twigs gray, white, or wanting; not of Hispaniola, nor of Cuba except in Camaguey.

7. Leaves, twigs, pedicels, and sepals finely gray-puberulent, sometimes eventually glabrate; Baja California and Sonora, Mexico.....18. *B. occidentalis*.

7. Leaves, twigs, pedicels, and sepals glabrous from the first, or with only a few inconspicuous white strigose hairs when young; Texas and adjacent Mexico, south to Venezuela, and Florida, Bahamas, and Camaguey, Cuba..... 19. *B. celastrina*.

1. Corolla-lobes without lateral appendages, or sometimes a mere vestige remaining in *B. conferta*; Cuba and Hispaniola.

2. Leaves essentially glabrous from the first; flowers 1-4 in a cluster.

3. Leaves 1.5-3.5 cm. wide; pedicels about 6-10 mm. long; Cuba..... 20. *B. conferta*.

3. Leaves 0.5-1.5 cm. wide; pedicels 2 mm. long or less; Hispaniola.. 21. *B. Picardae*.

2. Leaves strongly rufous-hairy beneath at least when young, sometimes subglabrate in age; flowers various.

3. Flowers about 5-25 in a cluster; leaves 1.5-2.5 cm. wide, the primary lateral veins evident beneath; Dominican Republic..... 22. *B. integra*.

3. Flowers solitary or 2 in the axils; leaves less than 1 cm. wide, only the midrib visible beneath; Oriente, Cuba..... 23. *B. revoluta*.

1. *Bumelia persimilis* Hemsl. Biol. Centr. Am. Bot. 2: 298. 1882.

Heavy-trunked spiny tree or large shrub, about 5-18 m. tall; leaves firm, ovate-oblong to elliptic or broadly elliptic-lanceolate, obtuse to more commonly acutish or acuminate, the larger about 5-12 cm. long and 2-5 cm. wide, from conspicuously velvety or spreading-villous with rufous hairs to finely strigose with rufous or gray hairs beneath when young, sooner or later generally more or less glabrate; primary lateral veins about 10-30 pairs, more or less evident, but not always sharply distinct from the larger secondary ones, the final reticulum evident or obscure, but not raised and conspicuous; petioles mostly 3-10 mm. long; flowers several or numerous in axillary clusters, from subsessile to sometimes borne on pedicels fully 1 cm. long; sepals densely rufous-hairy to glabrous, about 1.8-3.7 mm. long; corolla about 3-6 mm. long, the tube about 1.2-1.8 mm. long; anthers included or slightly exserted, 0.8-2 mm. long; staminodes about 1.7-3.8 mm. long, lanceolate to obovate, more or less laciniate; ovary short-pilose, especially near the base, to sometimes glabrous; style 3-7 mm. long; fruit oblong or ellipsoid to spheroidal, about 1.5-2.5 cm. long, reputedly sweet and edible.

TYPE COLLECTION: *Botteri* 989, Orizaba, Vera Cruz, Mexico (F — fragment, G, US).

DISTRIBUTION: Chihuahua, Mexico, to Federal District, Venezuela.

1A. *Bumelia persimilis* subsp. *typica* nom. nov.

Bumelia persimilis Hemsl. Biol. Centr. Am. Bot. 2: 298. 1882, sens. strict.

Bumelia leiogyna Donnell Smith, Bot. Gaz. 18: 4. 1893.

Bumelia pleistochasia Donnell Smith, loc. cit.

Bumelia megaphylla Blake, Contr. Gray Herb. n. ser. 52: 76. 1917.

Bumelia guatemalensis Standl. Trop. Woods 4: 9. 1925.

Bumelia panamensis Standl., loc. cit.

Bumelia barba-tigris Pittier, Man. Pl. Us. Venez. 125. 1926.

Bumelia Lankesteri Standl. Trop. Woods. 31: 40. 1932.

Bumelia Austin-Smithii Standl. Field Mus. Publ. Bot. 18: 905. 1938.

Bumelia elexochitlensis Schultes & Conzatti, Leafl. Bot. Mus. Harv. Univ. 9: 190. 1941.

Pubescence of the young twigs fine, appressed or a little loose, reddish or often gray, often sparse, that of the lower surfaces of the leaves fine, strictly appressed, and commonly soon deciduous, reddish or gray; corolla and style sometimes fully as long as in subsp. *subsessiliflora*, sometimes only

about 3 mm. long; sepals and ovary sometimes glabrous; fruit commonly spheroidal, sometimes more elongate.

LOCAL NAMES: *Corpus espina*, *doncello*, *espino blanco*, *espino de crudo*, *ispundio*, *limoncello*, *morespino*, *porcupine tree*, *tempisquito*, *zapotillo de peña*, *zapotillo bravo*.

DISTRIBUTION: Vera Cruz and Oaxaca, Mexico, to Federal District, Venezuela.

MEXICO: *Haenke* 1139 (F); *Haenke* 1596 (F); *Haenke* 1600 (F, NY); *Haenke* 1601 (F, NY). *Vera Cruz*: *Purpus* 13071 (A, F, Mo, NY). GUATEMALA: *El Petén*: *Egler* 42-214 (F). *San Marcos*: *Steyermark* 37199 (A, F). *Quezaltenango*: *Steyermark* 34370 (F). *Guatemala*: *Aguilar* 193 (F). *Sacatepéquez*: *Donnell Smith* 1451 (G, NY, US); *Donnell Smith* 2184 (G, NY, US); *Standley* 58875 (F); *Standley* 58898 (F). *Escuintla*: *Standley* 64784 (A, F, NY). *Jutiapa*: *Standley* 75645 (F); *Standley* 76223 (F); *Standley* 76304 (F); *Steyermark* 31791 (F). BRITISH HONDURAS: *Peck* 756 (G); *Schipp* 1077 (A, F, G, Mich, Mo, NY); *Schipp* 1339 (A, F, G, Mich, Mo, NY). EL SALVADOR: *Calderón* 294 (NY, US); *Calderón* 313 (G, Mo, NY, US); *Calderón* 1554 (US). COSTA RICA: *Brenes* 3874 (CR, F); *Lankester* 1194 (F); *Lankester* 1258 (F). *Guanacaste*: *Standley & Valerio* 45491 (US); *Standley & Valerio* 46426 (US). *Alajuela*: *Austin Smith* H163 (F); *Austin Smith* H229 (F); *Austin Smith* H610 (F, US); *Austin Smith* 2685 (US). *Cartago*: *Oersted* 315 (US); *Standley* 35881 (US). PANAMA: *Panama*: *Kluge* 12 (F, NY, US). COLOMBIA: *Atlántico*: *Dugand* 508-B (US); *Elias* 486 (NY, US); *Elias* 698 (NY, US); *Elias* 1170 (A, NY, US). BOLÍVAR: *Killip & Smith* 14487 (A, G, NY, US). VENEZUELA: *Tamayo* 1155 (US). ZULIA: *Tejera* 57 (G, US). Federal District: *Pittier* 5856 (NY); *Pittier* 9163 (G, NY, US).

1B. *Bumelia persimilis* subsp. *subsessiliflora* (Hemsl.) comb. nov.

Bumelia subsessiliflora Hemsl. *Biol. Centr. Am. Bot.* 2: 299. 1882.

Bumelia arborescens Rose, *Contr. U. S. Nat. Herb.* 1: 339. 1895.

Bumelia stenosperma Standl. *Contr. U. S. Nat. Herb.* 23: 1117. 1924.

Bumelia Lesueurii Standl. *Field Mus. Publ. Bot.* 22: 365. 1940.

Pubescence of the young twigs dense, rufous, spreading, often coarsely velvety, that of the lower surfaces of the leaves similar but often longer, looser, and less reddish, and commonly becoming appressed before eventually falling; corolla and style seldom under 4.5 mm. long; sepals and ovary always more or less hairy; fruit commonly oblong or ellipsoid.

TYPE COLLECTION: *Galeotti* 7198, Guadalajara, Jalisco, Mexico, 3000 feet (F — fragment).

LOCAL NAMES: *Bebelama*, *cupia*, *cupilla*.

DISTRIBUTION: Chihuahua and Durango to Michoacán and Oaxaca, Mexico.

MEXICO: Chihuahua: *Gentry* 2451 (F); *Hewitt* s.n. (A); *LeSueur* 1160 (F); *LeSueur* 1171 (G); *Lumholtz* 528 (G); *Zing* A13 (F). Sinaloa: *Ortega* 223 (G, US); *Ortega* 4241 (US); *Rose*, *Standley & Russell* 13893 (G, Mo). Durango: *Gentry* 5261 (G, Mo, NY). Colima: *Palmer* 1123 (A, G, Mich, Mo, NY, US). Michoacán: *Leavenworth & Hoogstraal* 1393 (Mo). Oaxaca: *Nelson* 2548 (F, US).

Bumelia persimilis is one of the several species in the genus with very wide ranges. It is characterized by its large leaves, broadest at or below the middle, with relatively numerous lateral veins, and without a conspicuous raised reticulum, by its large fruit, and by its relatively long style. Herbarium specimens do not indicate an unusual amount of intraspecific variability, except in pubescence, on which two subspecies may be founded. Some specimens from Guatemala, which have mostly been passing as *B. pleistochasia*, have a slightly different aspect than most others of the species and tend to have smaller flowers. Field study may show that

varietal recognition is warranted, but from the herbarium material it seems yet quite unjustified. *Bumelia Austin-Smithii* Standl., from Costa Rica, was described by the collector as having a pronounced nipple on the fruit, but it does not seem otherwise different. Careful field investigation may show the need for varietal recognition. *Bumelia stenosperma* Standl., described as having leaves only 1.5–3 cm. long, is merely subsp. *subsessiliflora* with the leaves young and not yet fully expanded. It should be noted that specimens of subsp. *subsessiliflora* with immature foliage have been collected in August, as well as in the spring, suggesting that some factor other than temperature, perhaps rainfall, has a controlling influence.

2. *Bumelia laetevirens* Hemsl. Biol. Centr. Am. Bot. 2: 298. 1882.

Bumelia mexicana Engl. Bot. Jahrb. 12: 519. 1890.

Bumelia Palmeri Rose, Gard. & For. 7: 195. 1894.

Acras olivacea Sesse & Moc. Fl. Mex. 91. 1894.

Spreading heavy-trunked tree much like *B. persimilis*, up to 15 m. tall, the herbarium specimens, at least, nearly always unarmed; leaves elliptic or ovate, broadly rounded to obtuse or acutish at the apex, firm, smooth and shining above, finely strigose or sericeous-strigose with tardily deciduous white hairs beneath, the larger commonly 6–12 cm. long and 2.5–6 cm. wide; venation much like *B. persimilis*, the secondary lateral veins sometimes a little more raised above; petioles about 10–20 mm. long; flowers numerous in axillary clusters, the pedicels commonly 2–8 mm. long; sepals glabrous, about 2–3.5 mm. long; corolla about 3–6 mm. long, the tube about 0.8–1.8 mm. long; anthers about 1–1.9 mm. long, slightly exserted; ovary sparsely pilose, especially below; style mostly 2–3 (rarely 4) mm. long; fruit black, subglobose, mostly 1.5–2 cm. long, edible.

TYPE COLLECTION: *Galeotti* 7000, Cordillera of Oaxaca, Mexico, at 3000 feet.

LOCAL NAMES: *Bebalama*, *cupia*, *tempesquistle*.

DISTRIBUTION: Sinaloa to Tamaulipas, south to Oaxaca and Vera Cruz, Mexico.

MEXICO: *Liebmann* 311 (US); *Liebmann* 312 (US); *Sesse, Mociño et al.* 5151 (F). Sinaloa: *Collins & Kempton* 69 (US); *Gentry* 5494 (F, G); *Ortega* 795 (F); *Ortega* 4174 (US); *Ortega* 4503 (US); *Ortega* 4532 (US); *Ortega* 5647 (US); *Ortega* 5686 (US); *Ortega* 5847 (G, US); *Ortega* 6703 (F, Mo, US); *Palmer* 1513 (G, NY, US); *Rose, Standley & Russell* 13897 (G, Mo). Durango: *Goldman* 334 (F, G, US). Tamaulipas: *LeSueur* 644 (F); *LeSueur* 648 (F); *Palmer* 212 (G, Mo, NY, US). San Luis Potosí: *Palmer* 48 (G, NY, US). Tepic: *Maltby* 99 (US). Hidalgo: *Chase* 7441 (F, G, Mo, NY). Vera Cruz: *Botteri* 1014 (G, US); *Palmer* 364 (G, Mo, NY, US). Mexico: *Matuda* 1229 (A, Mich, Mo). Puebla: *Pringle* 13872 (G, Mich, US); *Purpus* 5849 (G, Mo, NY, US); *Rojans* 4 (US); *Rose et al.* 10140 (NY, US). Oaxaca: *Conzatti* 2481 (F); *Conzatti* 3459 (US); *Conzatti* 4612 (US); *Conzatti* 4618 (US).

This species is obviously related to *B. persimilis*, and none of the characters separating it from that species, sens. amplior., shows real discontinuity. I have seen no evidence of hybridization, however, and am convinced that the two are properly considered distinct. It should be noted that *B. persimilis* subsp. *typica*, which sometimes approaches *B. laetevirens* in pubescence, does not occur through most of the range of the latter.

3. *Bumelia Altamiranoi* Rose & Standl. Contr. U. S. Nat. Herb. 23: 1117. 1924.

Spiny tree or shrub; young twigs loosely tomentose with gray-white or

at first tawny-rufous hairs; leaves ovate to elliptic-oblong, broadly rounded to acutish at the apex, 2.5–4.5 cm. long, 1.5–3 cm. wide, woolly-villous with persistent white hairs beneath, more finely hairy and eventually glabrate above; primary lateral veins about 4–10 pairs; secondary lateral veins forming a loose scarcely raised reticulum above; petioles about 3–6 mm. long; flowers unknown; fruit about 1.5–2 cm. long, subglobose, the pedicel 3 mm. long, woolly-villous, the persistent sepals about 3–4 mm. long, similarly white-hairy.

TYPE COLLECTION: *Rose, Painter & Russell* 9725, near Cadereyta, Queretaro, Mexico, August 21, 1905 (NY, US).

DISTRIBUTION: Known only from the type locality, Queretaro, Mexico. Another collection is *Altamirano* 1644 (US).

This species resembles forms of the more northern *B. lanuginosa* in pubescence but it has smaller, less reticulate leaves, and larger fruit. It may also be compared to *B. persimilis*, which has larger leaves with more numerous lateral veins, and in which the pubescence, if spreading, is always rufous.

4. *Bumelia eriocarpa* Greenman & Conzatti, Field Mus. Publ. Bot. 2: 334. 1912.

More or less thorny; twigs coarse, finely velutinous-tomentose, at least when young; leaves narrowly elliptic, lance-elliptic, or elliptic-oblong, rounded at the apex, the larger commonly 5–9 cm. long and 18–30 mm. wide, smooth and shining above, densely and sometimes very finely velutinous-tomentose beneath with gray or sometimes tawny, persistent or tardily deciduous hairs; primary lateral veins about 5–12 pairs; secondary veins few, forming a loose reticulum above and beneath; petioles about 5–10 mm. long; flowers in clusters axillary to leaves or leaf-scars, subsessile, the pedicels less than 2 mm. long, tawny-tomentose; sepals about 2.5–3.5 mm. long, hairy like the pedicels; corolla about 5–6 mm. long, the tube 1.7–2 mm. long; anthers 2 mm. long; ovary densely long-hairy; style 4 mm. long; fruit 1.5–2 cm. long, ellipsoid-globose, gall-like in appearance, covered with very short densely rufous-tomentose processes; seed (from a fruit 2 cm. long) 1.6 cm. long, its scar nearly orbicular, basilateral, 6.5 mm. long.

TYPE COLLECTION: *Conzatti* 1586, Cerro San Antonio, 1700 m., October 28, 1906, Oaxaca, Mexico (F, NY, US).

DISTRIBUTION: Oaxaca, Mexico.

MEXICO: Oaxaca: *Conzatti* 1772, Cerro del Tule, 1700 m. (F, G); *Conzatti* 2028, Cerro San Antonio, 1600 m. (F); *Smith* 159, Mts. of Jayacatlán, 4500 ft. (G).

Although evidently related to *B. persimilis*, *B. Altamiranoi*, and *B. lanuginosa*, this species is readily distinguished by its gall-like fruit. Additional differences will be noted when it is compared with any one of the related species.

5. *Bumelia lanuginosa* (Michx.) Pers. Syn. 1: 237. 1805.

Shrub or tree about 1–15 m. tall, more or less thorny; leaves oblanceolate to sometimes obovate or elliptic, broadly rounded to sometimes acute at the apex, mostly 2–10 cm. long and 0.5–3.5 cm. wide, loosely woolly-villous with white to tawny or rufous hairs when young, soon glabrate above, persistently hairy to sometimes soon glabrate beneath, reticulate-veiny on both sides, sometimes fascicled; flowers more or less numerous in each cluster,

the hairy or subglabrous pedicels 2–15 mm. long; sepals strongly hairy or nearly glabrous, 1.5–3.2 mm. long; corolla about 3–4.7 mm. long, the tube 1.3–2 mm. long; staminodes deltoid-ovate, about 1.9–2.7 mm. long, nearly equaling the corolla-lobes; anthers 1–1.5 mm. long; ovary pilose; style 1–1.5 mm. long; fruit obovoid to broadly ellipsoid or subglobose, commonly purplish-black, 7–12 mm. long.

TYPE COLLECTION: *Michaux*, Georgia.

DISTRIBUTION: Mostly in uplands, occasionally in bottoms; Florida to Missouri and Kansas, south to Texas, southern Arizona, and the northern tier of states in Mexico.

Key to the Subspecies

1. Larger leaves mostly 5–10 cm. long (occasionally smaller in *ssp. typica*) ; often over 5 m. tall; Florida to Missouri, Kansas, Oklahoma, eastern and central Texas, and Coahuila and Nuevo León, Mexico.
2. Pubescence of the leaves persistently tawny or rufous; almost entirely east of the Mississippi River..... *ssp. typica*.
2. Pubescence of the leaves gray or nearly white, occasionally tawny at first, before the leaves are fully expanded; almost entirely west of the Mississippi River..... *ssp. oblongifolia*.
1. Larger leaves mostly 2–5 cm. long; seldom over 4–5 m. tall; southwestern Oklahoma, through central and western Texas, to southern Arizona and the northern tier of states in Mexico..... *ssp. rigida*.

5A. *Bumelia lanuginosa* subsp. *typica* nom. nov.

Sideroxylon lanuginosum Michx. Fl. Bor. Am. 1: 122. 1803.

Bumelia lanuginosa Pers. Syn. 1: 237. 1805, sens. strict.

Chrysophyllum ludovicianum Raf. Fl. Ludovic. 53. 1817.

Bumelia rufa Raf. New Fl. N. Am. 3: 29. 1836.

Bumelia ferruginea Nutt. N. Am. Sylva 3: 34. 1849.

Characters and distribution as given in the key.

5B. *Bumelia lanuginosa* subsp. *oblongifolia* (Nutt.) stat. nov.

Characters and distribution as given in the key.

TYPE COLLECTION: *Nuttall*, Arkansas (same as *B. oblongifolia* Nutt.) (PA).

- 5B1. *Bumelia lanuginosa* subsp. *oblongifolia* var. *oblongifolia* (Nutt.) Clark, Ann. Mo. Bot. Gard. 29: 163. 1942 (as *B.l.* var. *o.*).
- Bumelia oblongifolia* Nutt. Gen. 1: 135. 1818.
- Bumelia arachnoidea* Raf. New Fl. N. Am. 3: 28. 1836.
- Bumelia tomentosa* A. DC. in DC. Prodr. 8: 190. 1844.
- Bumelia arborea* Buckl. Proc. Phil. Acad. 1861: 461. 1862.

Pubescence not very dense, generally merely grayish; pedicels tending to be short and stout. Range of the subspecies.

5B2. *Bumelia lanuginosa* subsp. *oblongifolia* var. *albicans* Sarg. Jour. Arnold Arb. 2: 168. 1921 (as *B.l.* var. *a.*).

Pubescence of the leaves long, dense, white or nearly so, commonly less tangled than in var. *oblongifolia*; pedicels tending to be long and slender, with some conspicuously spreading hairs. Texas and southeastern Oklahoma, extending into Nuevo León.

TYPE COLLECTION: *Sargent* s.n., Guadelupe River bottoms, Victoria, Victoria County, Texas, April 9, 1915 (A).

5C. *Bumelia lanuginosa* subsp. *rigida* (A. Gray) stat. nov.

Characters and distribution as given in the key.

TYPE COLLECTION: Same as *B. lanuginosa* var. *rigida* A. Gray.

5C1. *Bumelia lanuginosa* subsp. *rigida* var. *rigida* A. Gray, *Syn. Fl. ed. 2* 2(1): 68. 1886 (as *B.L.* var. *r.*).

Bumelia rigida Small, *Bull. N. Y. Bot. Gard.* 1: 444. 1900.

Pubescence of the leaves persistent, or only in age partly deciduous; pedicels and sepals evidently hairy. Southwestern Oklahoma, through central Texas to northern Mexico, thence west to southern Arizona.

TYPE COLLECTION: Not specified, from among collections by *Wright*, *Palmer*, *Pringle*, and *Lemmon*.

5C2. *Bumelia lanuginosa* subsp. *rigida* var. *texana* (Buckl.) comb. nov.

Bumelia texana Buckl. *Bull. Torrey Club* 10: 90. 1883.

Bumelia monticola Buckl. *op. cit.* 91.

Bumelia riograndis Lundell, *Contr. Univ. Mich. Herb.* 8: 77. 1942.

Pubescence of the leaves finer and less dense than in var. *rigida*, soon largely deciduous except for a few hairs along the midrib; pedicels and sepals usually sparsely hairy or subglabrous, sometimes more evidently hairy. Southwestern Oklahoma, western and central Texas, and adjacent Mexico.

TYPE COLLECTION: *Buckley s.n.*, mountains near the lower crossing of the Pecos River on the road from Ft. Stockton to old Fort Lancaster and the head of Devil's River (NY).

The data on herbarium labels would indicate that subspecies *typica* and *oblongifolia* do not ordinarily ascend to more than about 1500 feet, while subspecies *rigida* seldom descends below that level. The range of variation in pubescence of subsp. *oblongifolia* and subsp. *rigida* is about the same, although the latter is much more often soon subglabrate than the former. The division of subsp. *oblongifolia* into var. *oblongifolia* and var. *albicans* is comparable to the division of subsp. *rigida* into var. *rigida* and var. *texana*, but the line is not drawn in just the same place. The var. *texana* is much less hairy than the average of its counterpart, var. *oblongifolia*. In each of these two subspecies, the two varieties share a large part of their range in common, but have entirely individual range-outlines. The varieties of ssp. *rigida* are fairly well defined, but clearly intergrade. As shown on Clark's map, var. *texana* occurs frequently through a large part of western Texas where var. *rigida* is apparently absent. The varieties of subsp. *oblongifolia*, on the other hand, are rather poorly defined, and the range of var. *albicans* is entirely included within that of var. *oblongifolia*. The typical subspecies is apparently always rather copiously hairy. The nearest thing to a subglabrate phase is furnished by *B. reclinata*, which also differs in its lower habit, smaller leaves, and smaller fruit, and seems quite distinct.

6. *Bumelia lycioides* (L.) Pers. *Syn. 1*: 237. 1805.

Sideroxylon spinosum Duham. *Arb.* 2: 260. 1755. Not *Bumelia spinosa* A. DC. 1844.

Sideroxylon lycioides L. *Sp. Pl. ed. 2*: 279. 1762.

Sideroxylon decandrum L. *Mant.* 48. 1767.

Robertia decandra Scop. *Introd.* 154. 1777.

Sideroxylon laeve Walt. *Fl. Carol.* 100. 1788.

Decateles lycioides Raf. *Sylv. Tellur.* 36. 1838.

Lycioides spinosum Kuntze, *Rev. Gen.* 2: 406. 1891.

Bumelia cassinifolia Small, *Bull. N. Y. Bot. Gard.* 1: 442. 1900.

Bumelia lucida Small, loc. cit., not Roem. & Schult.

Bumelia lycioides var. *virginiana* Fernald, Rhodora 38: 439. 1936.

Bumelia lycioides var. *ellipsoidalis* Clark, Ann. Mo. Bot. Gard. 29: 172. 1942.

Bumelia Smallii Clark, Ann. Mo. Bot. Gard. 29: 172. 1942.

Shrub or small tree, about 1–10 m. tall, often thorny; young twigs glabrous; leaves mostly elliptic or elliptic-ob lanceolate and narrowed to the acuminate to obtuse apex, occasionally obovate and broadly rounded, commonly 4–13 cm. long and 1–4.5 cm. wide, occasionally some of them smaller, conspicuously reticulate-veiny on both sides, glabrous above, glabrous or more commonly with a few short hairs chiefly along the midrib beneath, the very young leaves more evidently silvery, but the pubescence evanescent; flowers numerous, commonly about 20–60 in a cluster, the pedicels glabrous or slightly hairy, mostly 4–10 mm. long; sepals glabrous, or with a few reddish hairs within, about 1.4–2.9 mm. long; corolla 3.2–4 mm. long, the tube shorter than or sometimes equaling the lobes; anthers 1.2–1.7 mm. long; style about 1.1–2 mm. long; ovary short-hairy; staminodes ovate or rhombic-ovate, about 1.8–2.4 mm. long; fruit ellipsoid to ovoid or ellipsoid-globose, commonly 7–13 mm. long; seeds about 6–9 mm. long, commonly tan or light brown, occasionally a little variegated.

TYPE COLLECTION: None given; references to several older works.

DISTRIBUTION: River-banks and wet or dry woods; Florida to eastern coastal Texas, north to Arkansas, s. Missouri, s. Indiana, and s. Virginia.

Neither the shape of the fruit nor the shape of the leaf-apex, on which bases varieties have been proposed, shows sufficient constancy to furnish grounds for taxonomic segregation. *B. Smallii* is described by Clark as a small-leaved relative with the leaves only 2–5 cm. long, but several of the collections at the New York Botanical Garden so annotated by Clark have the larger leaves 4.5–8 cm. long, well within the normal range of variation in *B. lycioides*.

7. *Bumelia reclinata* (Michx.) Vent. Choix des Pl. pl. 22. 1803.

Low spiny often spreading or decumbent shrub about 0.4–2 m. tall, rarely a little taller; young twigs varying from sparsely white-hairy or subglabrous to densely rufous-tomentulose, eventually glabrate; leaves oblanceolate to nearly obovate or elliptic, rounded to occasionally retuse at the apex, about 0.5–5 cm. long and 0.2–2.5 cm. wide, evidently reticulate-veiny on both sides, hairy when young, the pubescence generally denser, looser, and woollier than in *B. lycioides*, but evanescent; flowers commonly less than 20 in each cluster, the pedicels about 3–13 mm. long, glabrous or appressed-hairy; sepals glabrous or appressed-hairy, mostly 1.3–2.1 mm. long; corolla about 2.6–3.9 mm. long, the tube shorter than the lobes; anthers about 0.6–1.1 mm. long; staminodes lance-elliptic to deltoid-ovate, about 1.3–1.8 mm. long; ovary glabrous or hairy; fruit subglobose, 4–7 mm. long.

TYPE COLLECTION: Michaux, "in dumetis ripariis Georgiae."

DISTRIBUTION: Low, often sandy ground; Florida, extending into southern Georgia. There is also in the Torrey Herbarium a single specimen labeled "Louisiana. Dr. Hale.", which apparently constitutes the sole basis for the frequent inclusion of Louisiana in the cited range.

7A. *Bumelia reclinata* var. *reclinata* (Michx.) comb. nov.

Sideroxylon reclinatum Michx. Fl. Bor. Am. 1: 122. 1803.

Bumelia reclinata Vent. *Choix des Pl. pl. 22.* 1803, sens. strict.

Bumelia macrocarpa Nutt. *N. Am. Sylva 3: 34.* 1849.

Bumelia lycioides var. *reclinata* A. Gray, *Syn. Fl. 2(1): 68.* 1878.

Bumelia microcarpa Small, *Bull. N. Y. Bot. Gard. 1: 440.* 1900.

Pubescence white or grayish, not at all rufous, evanescent; young twigs generally only sparsely hairy; ovary glabrous or sometimes hairy. Range of the species.

7B. *Bumelia reclinata* var. *rufotomentosa* (Small) comb. nov.

Bumelia rufotomentosa Small, *Bull. N. Y. Bot. Gard. 1: 440.* 1900 (as *B. rufotomentosa*).

Pubescence strongly rufous, generally coarser than in var. *reclinata*, a few hairs commonly persisting on the lower leaf-surfaces until maturity; young twigs strongly rufous-tomentulose; ovary generally hairy. Local from Alachua to Orange and Hillsborough Counties, Florida.

TYPE COLLECTION: *Garber s.n.*, Tampa, Hillsborough County, Florida, May, 1876 (NY, US).

8. *Bumelia tenax* (L.) Willd. *Sp. Pl. 1: 1085.* 1798.

Sideroxylon tenax L. *Mant. 48.* 1767.

Chrysophyllum carolinense Jacq. *Obs. 3: 3. pl. 54.* 1768.

Sideroxylon sericeum Walt. *Fl. Car. 100.* 1788.

Sideroxylon chrysophylloides Michx. *Fl. Bor. Am. 1: 123.* 1803.

Bumelia chrysophylloides Pursh, *Fl. Am. Sept. 1: 155.* 1814.

Sclerocladus tenax Raf. *Sylv. Tellur. 35.* 1838.

Sclerozus tenax Raf. *Aut. Bot. 2: 73.* 1840.

Bumelia megacocca Small, *Bull. N. Y. Bot. Gard. 1: 441.* 1900.

Bumelia lacuum Small, *Man. S. E. Fl. 1034.* 1933.

Branching thorny shrub or small tree about 1–5 m. tall; young twigs puberulent to sericeous-tomentose with mostly rufous or tawny hairs; leaves oblanceolate to spatulate or sometimes nearly elliptic, rounded at the apex, mostly 1–8 cm. long and 0.4–3.5 cm. wide, glabrous and evidently reticulate-veiny on the upper surface, densely sericeous or sericeous-tomentose with mostly tawny or rufous hairs on the lower surface, the pubescence often obscuring the veins; flowers about 10–30 in a cluster, the clusters sometimes closely aggregated, the pedicels rufous-hairy to occasionally subglabrate, commonly 6–15 mm. long; sepals finely rufous-sericeous or -stribose, about 1.5–3 mm. long; corolla about 3.1–4.2 mm. long, the lobes a little longer than the tube; anthers about 1.1–1.5 mm. long; staminodes broadly ovate, about 1.5–1.9 mm. long; ovary shortly pilose; style about 1–1.5 mm. long; fruit obovoid to ellipsoid or subglobose, about 8–14 mm. long; seed solitary, about 6–9 mm. long, very smooth and shining, light brown, occasionally somewhat variegated.

TYPE COLLECTION: *Dr. Alexander Garden*, South Carolina, probably near Charleston.

DISTRIBUTION: Dry, often sandy soil; coastal plain, from South Carolina to Florida.

An uncommon but widely distributed form with the pubescence of the leaves merely silvery may be known as *Bumelia tenax* f. *anomala* (Sarg.) comb. nov. (*Bumelia lanuginosa* var. *anomala* Sarg. *Jour. Arnold. Arb. 2: 168.* 1921; *Bumelia anomala* Clark, *Ann. Mo. Bot. Gard. 29: 169.* 1942).

9. *Bumelia obtusifolia* Roem. & Schult. *Syst. Veg. 4: 802.* 1819.

Large, more or less spiny shrub or small tree, up to 15 m. tall; twigs sericeous or sometimes loosely sericeous-tomentose with pale or sometimes

rufous hairs when young, soon glabrate; leaves from oblanceolate to suborbicular, broadly rounded at the apex, gradually or abruptly tapering at the base, commonly 2–5 cm. long and 1–3 cm. wide, sometimes larger, as much as 9 cm. long and 4.5 cm. wide, sericeous or strigose beneath with gray or faintly rufous-tinted hairs when young, later glabrate, obscurely or sometimes more evidently veiny; flowers 1 — numerous in axillary clusters, subsessile or on pedicels up to 8 mm. long; sepals 1.3–3 mm. long, strigose or sericeous with gray hairs; corolla about 2.4–5.4 mm. long, its tube 0.5–2 mm. long; anthers 0.9–2 mm. long; staminodes from narrowly oblong and erose to ovate and subentire, sometimes hooded, about 1.5–3.2 mm. long; style about 1.5–4.6 mm. long; fruit ellipsoid-cylindric to subglobose, about 8–15 mm. long.

TYPE COLLECTION: *Humboldt & Bonpland*, "in ripa fluminis Amazonum, ad confluentem Chinchipen, alt. 200 h. (Prov. Jaen de Bracamoros)", at the north end of the present province of Cajamarca, Peru.

DISTRIBUTION: Southern Mexico to northern Argentina.

LOCAL NAMES: *Has toch, chi cheh chehum, sinan-che, malermo, picurero, picuyú, caimito, piquillin, ivira-nina*.

9A. *Bumelia obtusifolia* subsp. *typica* nom. nov.

Bumelia obtusifolia Roem. & Schult. Syst. Veg. 4: 802. 1819, sens. strict.

Leaves about twice as long as wide, subelliptic to broadly oblanceolate or narrowly obovate; flowers in axillary clusters of about 1–5, the pedicels 2–4 mm. long; corolla 4.7–5.2 mm. long; style about 4 mm. long; staminodes ovate or oblong, subentire, more or less hooded.

DISTRIBUTION: Ecuador and northern Peru.

ECUADOR: Manabí: *Haught* 3377, abundant near the sea, between Salango and Puerto Lopez (NY, US).

9B. *Bumelia obtusifolia* subsp. *buxifolia* (Roem. & Schult.) stat. nov.

Bumelia buxifolia Roem. & Schult. Syst. Veg. 4: 802. 1819.

Bumelia Dunantii A. DC. in DC. Prodr. 8: 191. 1844.

Bumelia Cruegerii Griseb. Fl. Brit. W. Ind. 401. 1861.

Bumelia obtusifolia var. *buxifolia* Miq. in Mart. Fl. Bras. 7: 47. 1863.

Bumelia guatemalensis Standl. Trop. Woods 4: 9. 1925.

Bumelia Grisebachii Pierre in Urb. Symb. Ant. 5: 141. 1904.

Bumelia nicaraguensis Loes. Bot. Jahrb. 60: 367. 1926.

Bumelia conglobata Standl. Trop. Woods 31: 40. 1932.

Bumelia mayana Standl. Trop. Woods 31: 41. 1932.

Leaves mostly 1–2 times as long as wide, broadly elliptic to obovate or suborbicular; petioles generally conspicuously exceeding the pedicels; flowers more or less numerous in dense clusters; corolla about 2.4–5.4 mm. long; style about 1.5–4 mm. long; staminodes ovate, subentire, scarcely or not at all hooded.

TYPE COLLECTION: *Humboldt & Bonpland*, Cumaná, Sucre, Venezuela (NY—photo).

DISTRIBUTION: Tabasco, Mexico, to Nicaragua; northern Colombia and Venezuela to Trinidad, chiefly near the coast.

MEXICO: Tabasco: *Matuda* 3034 (A, Mich). Campeche: *Lundell* 1277 (A, F, G, Mich, Mo, NY, US); *Stewart* 130 (G). Yucatán: *Gaumer* 473 (A, F, Mich, Mo, NY, US); *Gaumer* 1572 (F); *Gaumer* 1791 (A, F, G, Mo, NY, US); *Gaumer* 23238 (A, F, G, Mo, NY, US); *Gaumer* 23845 (F, G, Mo, NY, US); *Lundell* 7501 (A); *Schott* 341 (F, US); *Schott* 341A (F); *Schott* 341B (F); *Seler* 4937 (G, US); *Steere* 1674 (Mich); *Stewart* 258 (G). Quintana Roo: *Lundell* 7717 (A); *Steere* 2399

(F, Mich). GUATEMALA: El Petén: *Bartlett* 12290 (A, F, G, Mich, NY, US); *Bartlett* 12593 (A, NY, F); *Bartlett* 12739 (A, Mich, NY, US); *Lundell* 2201 (Mich). Baja Verapaz: *Kellerman* 6588 (F). Zacapa: *Steyermark* 29363 (F). BRITISH HONDURAS: *Bartlett* 13099 (Mich). HONDURAS: Comayagua: *Edwards* 559 (A, F, US). Tegucigalpa: *Dyer* 268 (US). NICARAGUA: *Wright* s.n. (G, US). Matagalpa: *Rothschuhe* 463 (F—photo & fragment, G—photo, NY—photo). COLOMBIA: Magdalena: *Herbert Smith* 2740 (A, G, NY); *Herbert Smith* 2071 (A, G, NY, US). VENEZUELA: *Curran & Haman* 810 (G, NY); *Curran & Haman* 910 (A, G, NY, US); *Curran & Haman* 1266 (G, US); *Tamayo* 771 (US); *Tamayo* 2083 (US). Zulia: *Curran & Haman* 759 (G). Falcón: *Curran & Haman* 564 (G, NY, US). Carabobo: *d'Heguert* 861 (NY). Federal District: *Pittier* 7765 (G, US); *Pittier* 9206 (G, NY, US); *Pittier* 12432 (A, NY, US); *Pittier* 13386 (A, NY, US); *Pittier* 13479 (US); *Rose* 21830 (US); *Tamayo* 1139 (US). Sucre: *Bond, Gillin & Brown* 44 (NY); *Broadway* 107 (G, NY, US); *Broadway* 213 (G, NY, US); *Broadway* 613 (G, NY, US); *Broadway* 651 (G, NY, US); *Johnston* 273 (G). TRINIDAD: *Britton & Bailey* 2240 (G, NY, US); *Britton & Broadway* 2633 (G, NY, US); *Britton & Hazen* 817 (G, NY, US), 1725 (G, NY, US); *Britton et al.* 2696 (NY, US); *Broadway* 8085 (A); *Hart* 2196 (NY, US).

9C. *Bumelia obtusifolia* subsp. *excelsa* (A. DC.) stat. nov.

Bumelia sartorum Mart. Herb. Fl. Bras. 233. 1837–40.

Bumelia rhamnoidea Casar. Nov. Stirp. Bras. Dec. 64. 1843.

Bumelia excelsa A. DC. in DC. Prodr. 8: 192. 1844.

Bumelia obtusifolia var. *excelsa* Miq. in Mart. Fl. Bras. 7: 48. 1863.

Bumelia fragrans Ridley, Jour. Linn. Soc. 27: 43. 1890.

Leaves mostly 1.5–3.5 times as long as wide, oblanceolate to elliptic or narrowly obovate; petioles scarcely if at all exceeding the pedicels; flowers in loose clusters of about 1–10; corolla about 3.3–4.7 mm. long, its tube only 0.6–1.5 mm. long; staminodes narrowly oblong to lance-ovate, erose, not hooded.

TYPE COLLECTION: *Blanchet* 2162, "in maritimis ca. Bahiam," Brazil.

DISTRIBUTION: Piauhy, Pernambuco, and Fernando do Noronha Island, Brazil, south to Rio de Janeiro, and inland to Paraguay, northern Argentina, and southern Bolivia.

BRAZIL: *Riedel* 19 (US). Piauhy: *Luetzelburg* 1643 (NY). Fernando do Noronha Island: *Ridley, Lea & Ramage* 97 (G). Pernambuco: *Pickel* 3386 (A, G). Bahia: *Blanchet* 2763 (NY). Rio de Janeiro: *Glaziou* 11159 (NY, US), 18439 (A, NY); *Riedel* 543 (US). PARAGUAY: *Fiebrig* 5392 (US); *Hassler* 2153 (G), 7200 (A), 7250 (G), 11507 (A), 11811 (A, G, US), 12286 (A, G, US); *Kuntze* s.n. (in 1892) (NY); *Malme* 1032 (G, NY, US). ARGENTINA: Jujuy: *Eyerdam & Beetle* 22547 (G), 22548 (G); *Lillo* 10792 (G), 10838 (G). Salta: *Eyerdam & Beetle* 22896 (G), 22929 (G); *Parodi* 9219 (G); *Rodriguez* 54 (G); *Rodriguez* 1129 (NY); *West* 6147 (G). Tucumán: *Lillo* 7208 (G); *Venturi* 1059 (G, US); *Venturi* 1530 (A, US); *Venturi* 7588 (US). Formosa: *Jorgensen* 2154 (G). Chaco: *Jorgensen* 1954 (G, US); *Venturi* 9768 (A, G, US). Corrientes: *Parodi* 11922 (G). BOLIVIA (Southern): *Pflanz* 693 (G).

The northern and southern phases of subsp. *buxifolia* show different trends of variation, but many individuals are quite indistinguishable in the herbarium. The more northern plants have a short style (1.5–3 mm.), often have relatively large leaves (to 9 × 4.5 cm.), and tend to have narrowly ellipsoid fruit. The southern ones have a longer style (to 4 mm.), seldom have the leaves over 5 cm. long, tend to have broader often subglobose fruit, and sometimes have the lateral lobes of the corolla-lobes conspicuously reduced or even obsolete. In spite of the apparent geographi-

cal disjunction of more than 600 miles, taxonomic segregation seems unwise until more stable distinguishing features are found.

Subspecies *excelsa* differs from ssp. *buxifolia* in an imposing array of features, none of which is quite constant. In addition to the characters given in the description, it frequently has the leaves more persistently pubescent beneath than does ssp. *buxifolia*, with hairs that may be slightly rufous-tinted, and tends to have a more nearly rotate, less campanulate corolla.

I have not seen the type of *B. obtusifolia*, but from the description and locality I think it should be associated with a single collection from Ecuador, which has narrow leaves and few flowers, like ssp. *excelsa*, but short pedicels and ovate entire staminodia like ssp. *buxifolia*. The Ecuadorean specimen also differs from both ssp. *buxifolia* and ssp. *excelsa* in having the staminodia more or less hooded. The flowers of *B. obtusifolia* were originally described as white, but, although collectors' notes for ssp. *buxifolia* and ssp. *excelsa* indicate white or greenish flowers, it is uncertain whether the color was noted by Humboldt in the field, or merely taken from the dried specimen by Kunth. The Ecuadorean specimen was noted by the collector to have yellow flowers; it is not known whether or not this color difference is significant.

10. *Bumelia rotundifolia* Sw. Prodr. Veg. Ind. Occ. 50. 1788.
Achras rotundifolia Poir. in Lam. Encyc. Meth. 6: 534. 1804.
Bumelia Purdiaei Urb. Symb. Ant. 5: 143. 1904.
Bumelia clarendonensis Urb. Rep. Sp. Nov. 13: 470. 1915.
Bumelia clarendonensis Urb. Rep. Sp. Nov. 21: 67. 1925, not 1915.
Bumelia peckhamensis Urb. Rep. Sp. Nov. 22: 93. 1925.

Small unarmed tree about 4–9 m. tall, essentially glabrous from the first, or the young twigs occasionally with some appressed evanescent white hairs; leaves firm, suborbicular or broadly elliptic to occasionally obovate, about 1.5–7.5 cm. long and 1–5 cm. wide, alternate or opposite, evidently veiny when young, less so with advancing age, often becoming very obscurely so, borne on short petioles about 3–7 mm. long; flowers in axillary clusters of about 3–12, the pedicels mostly 3–6 mm. long, glabrous; sepals glabrous, about 1–2.5 mm. long, firmly erect and becoming cartilaginous at the base, restricting the lateral growth of the base of the fruit; corolla about 3.2–3.9 mm. long; anthers 1.2–1.5 mm. long; staminodes about 1.5–1.8 mm. long; style about 2–3 mm. long; mature fruit unknown, but maturing fruit ellipsoid, about 7 mm. long.

TYPE COLLECTION: *Swartz*, Jamaica.

DISTRIBUTION: Jamaica.

JAMAICA: *Britton* 2824 (NY), 3067 (NY); *Britton & Hollick* 1865 (NY), 2220 (NY); *Harris* 6169 (NY), 10035 (NY), 10165 (NY, US), 10386 (NY, US), 11040 (NY), 11111 (NY); *Purdie* s.n. (G, NY).

This species is related to *B. obtusifolia*, from which it differs in being essentially glabrous from the first, with the leaves becoming very firm, and in its distribution. The only other species of *Bumelia* that occurs on Jamaica is *B. retusa*, from which the present species likewise differs in being glabrous, with broader leaves that rarely taper to the base. One specimen

(*Walsingham* s.n. — NY) seems intermediate between *B. rotundifolia* and *B. retusa*, and may be a hybrid.

11. *Bumelia retusa* Sw. Prodr. Veg. Ind. Occ. 49. 1788.

Shrub or small tree about 1–6 m. tall, ordinarily nearly or quite unarmed; young twigs sericeous-strigose with rufous hairs which may later turn pale; leaves alternate or opposite, narrowly to broadly obovate or occasionally suborbicular, narrowed at the base, broadly rounded at the apex, mostly 1.5–5 (rarely 7) cm. long and 7–40 mm. wide, rather obscurely or scarcely reticulate, densely and finely sericeous-strigose with rufous hairs on both sides when young, very soon glabrate above, tardily so below, the hairs often turning pale before falling; petioles about 2–8 mm. long; flowers in axillary clusters of about 1–10, the pedicels 2–13 mm. long, sericeous-strigose with rufous hairs that eventually fade; sepals rufous-strigose, about 1.5–3.3 mm. long; corolla about 3.3–5.5 mm. long, the tube 1–2 mm. long; anthers 0.8–1.7 mm. long; staminodes ovate or lanceolate to rotund, erose or subentire, about 1.3–2.8 mm. long; style about 0.7–4.6 mm. long; fruit black, broadly ellipsoid or subglobose, about 6–12 mm. long.

TYPE COLLECTION: None given; stated to come from Jamaica.

DISTRIBUTION: Bahama Islands; Navassa Island; Jamaica; Santa Clara and Pinar del Rio, Cuba; southern Vera Cruz to Yucatán and British Honduras. Chiefly or entirely in coastal areas.

11A. *Bumelia retusa* subsp. *typica* nom. nov.

Bumelia retusa Sw. Prodr. Veg. Ind. Occ. 49. 1788, sens. strict.

Achras retusa Poir. in Lam. Encyc. 6: 533. 1804.

Bumelia retusa var. *loranthifolia* Pierre in Urb. Symb. Ant. 5: 145. 1904.

Bumelia loranthifolia Britt. Bull. N.Y. Bot. Gard. 3: 447. 1905.

Bumelia bahamensis Britt. loc. cit.

Bumelia oblongata Urb. Symb. Ant. 6: 31. 1909.

Bumelia excisa Urb. Rep. Sp. Nov. 13: 471. 1915.

Bumelia Roigii Britt. & Small, Bull. Torrey Club 53: 461. 1926.

Bumelia navassana Urb. & Ekm. Ark. Bot. 22A(17): 71. 1929.

Flowers relatively small, the corolla mostly 3.3–4.5 mm. long, the anthers about 0.8–1.3 mm., the staminodes about 1.3–2 mm. long, the style about 0.8–3.3 mm. long. Bahamas, Cuba, Navassa, and Jamaica.

BAHAMAS: Abaco: *Brace* 1565 (NY); *Brace* 1543 (NY). Acklin's Island: *Brace* 4366 (G, NY, US); *Brace* 4476 (F); *Eggers* 3924 (US). Andros: *Brace* 5034 (NY); *Brace* 5151 (NY); *Brace* 5264 (NY); *Brace* 5311 (NY); *Brace* 5323 (NY); *Northrop* 544 (A, F); *Small & Carter* 8545 (G, NY, US); *Small & Carter* 8612 (G, NY, US). Anguilla Isles: *Wilson* 7955 (Mo, NY). Atwood Cay: *Wilson* 7396 (G, NY). Berry Islands: *Britton & Millspaugh* 2243 (NY). Caicos Group: *Millspaugh* 9223 (G, NY). Cat Island: *Britton & Millspaugh* 5964 (F, NY); *Wilson* 7164 (G, NY). Crooked Island: *Brace* 4600 (NY, US); *Brace* 4698 (NY); *Rothrock* 246 (F). Eleuthera: *Britton* 6416 (NY); *Britton & Millspaugh* 5412 (NY); *Britton & Millspaugh* 5426 (F, NY); *Britton & Millspaugh* 5433 (NY, F). Exuma Chain: *Britton & Millspaugh* 2780 (NY); *Wilson* 7894 (NY). Great Bahama: *Britton & Millspaugh* 2565 (NY). Great Exuma: *Britton & Millspaugh* s.n. (NY). Great Ragged Island: *Wilson* 7818 (G, NY); *Wilson* 7864 (G, NY). Inagua: *Nash & Taylor* 975 (NY); *Nash & Taylor* 1282 (NY); *Nash & Taylor* 1294 (NY). Little San Salvador: *Britton & Millspaugh* 5664 (F, NY). Long Cay: *Brace* 4071 (NY). Long Island: *Britton & Millspaugh* 6301 (F, NY). Mariguana: *Wilson* 7463 (G, NY). New Providence: *Britton* 44 (NY); *Britton* 88 (NY); *Britton & Brace* 283 (G, NY, US); *Britton*

& Brace 290 (NY, US); Britton & Brace 295 (NY, US); Britton & Brace 315 (NY); Britton & Brace 351 (NY, US); Britton & Brace 538 (G, Mo, NY, US); Curtiss 85 (A, G, Mo, NY, US); Wilson 8175 (NY); Wilson 8196 (NY); Wilson 8225 (NY); Wilson 8349 (NY). North Bimini: Brace 3475 (NY). Rose Island: Britton & Millspaugh 2131 (G, NY, US). Rum Cay: Brace 3946 (NY). St. George's Cay: Coker 315 (NY). Turk's Islands: Millspaugh 9363 (G, NY). Watling's Island: Britton & Millspaugh 6168 (F, NY); Rothrock 295 (F, NY); Wilson 7240 (G, NY); Wilson 7261 (G, NY). CUBA: Pinar del Río: Roig 3256 (Cu, NY, US); Roig 3257 (NY). Habana: Acuña 10942 (Cu). Santa Clara: Ekman 18560 (A, F, G, Mo, NY, US). NAVASSA ISLAND: Ekman 10811 (US). JAMAICA: Britton 1153 (NY, US); Britton 1244 (NY); Britton 2544 (NY); Harris 9729 (NY, US); Harris 9734 (NY, US); Harris 10380 (NY, US).

11B. *Bumelia retusa* subsp. *neglecta* subsp. nov.

A subsp. *typica* differt floribus majoribus, corolla 4.3–5.5 mm. longa, antheris 1.4–1.7 mm. longis, staminodiis 2.5–2.8 mm. longis, stylo 3.3–4.6 mm. longo.

TYPE: Schipp 585, open places at edge of mangroves, 5 feet elevation, All Pines, British Honduras, August 20, 1930 (F); isotypes, A, G, Mich, Mo, NY.

DISTRIBUTION: Along the coast from southern Vera Cruz to Yucatán and British Honduras.

MEXICO: Vera Cruz: Charles L. Smith 1123, Coatzacoalcos (US). Yucatán: Gaumer 23210, Yaxactun (Mo, US), 23338, Mina de Oro (A, F, G, Mo, NY, US); Goldman 594, Progreso (US); Lundell 7392, Progreso (A); Schott 313, Progreso (F, Mo, US), 313a, Celestun (F). Quintana Roo: Gaumer 131, Cozumel Island (G), s.n., in 1836, Mugeres Island (US).

A few specimens of *B. retusa* from the Bahama Islands have very spiny twigs with reduced less than usually hairy leaves under 1 cm. long, thus seemingly approaching *B. glomerata*. They pass into the more typical forms of the species, however, and in one case the collector noted that they are young twigs from an otherwise apparently not unusual plant. Hybridity seems out of the question, since the only other species of *Bumelia* known to occur in the Bahamas is *B. celestrina*, which these plants do not resemble.

Urban and Ekman differentiated *B. navassana* from *B. retusa* by its opposite instead of alternate leaves, but it may be noted that the original description of *B. retusa* called for opposite leaves. The leaves may in fact be either alternate or opposite, even on the same plant. *B. Roigii* was described as having a relatively large fruit 1.5 cm. in diameter, but the fruit on the type may be abnormal, and those on the isotypes are smaller.

12. *Bumelia socorrensis* Brandegee, Zoe 5: 106. 1901.

Tree up to 25 m. tall, apparently unarmed except for sometimes a few short axillary spines; twigs finely sericeous-strigose with rufous hairs when young, soon glabrate; leaves broadly oblanceolate, about 4–8 cm. long and 1.5–3.5 cm. wide, tapering to the base, broadly rounded at the apex, finely rufous-strigose on both sides when young, later more or less glabrate, evidently reticulate at least beneath, but the veins not much raised, the primary lateral ones about 8–15 pairs, not always sharply separable from the larger secondary ones; petioles about 5–10 mm. long; flowers in axillary clusters of about 1–5, appearing short and bulky, the pedicels rufous-sericeous, about 1–4 mm. long; sepals more or less rufous-hairy,

about 2.3–3.5 mm. long; corolla about 4–5 mm. long, the tube thick, 1.5–2 mm. long, the lobes much thinner; staminodes about 2.5–3 mm. long; filaments coarse, the anthers only about 1.1–1.4 mm. long; ovary slightly 5-lobed, brown-hairy, its style about 2.8–4 mm. long; fruit reputedly ellipsoid, 12–14 mm. long and 8 mm. thick, dark blue.

TYPE COLLECTION: *Anthony s.n.*, Socorro Island, Mexico (G).

DISTRIBUTION: Socorro Island.

MEXICO: Socorro Island: *Barkelew* 190 (A, G, Mo, NY, US); *Mason* 1638 (A, G, US); *Solis* 82 (US).

This species, while sharply distinct, seems to be allied to *B. persimilis* on the one hand and *B. peninsularis* on the other. It differs from the former in its characteristically oblanceolate broadly rounded leaves with fine appressed rufous pubescence, and in its somewhat smaller fruit. It differs from *B. peninsularis* in its larger size, larger more oblanceolate leaves with finer pubescence, and in its smaller flowers, particularly its smaller anthers. *B. socorrensis* is of course geographically remote from all others of the genus.

13. *Bumelia peninsularis* Brandegee, *Zoe* 5: 107. 1901.

Shrub 3–4 m. tall, much branched from the base, provided with short axillary spines; twigs pubescent with appressed rufous hairs when young, later glabrate; leaves elliptic, elliptic-ovate, or elliptic-oblong, about 2.5–4.5 cm. long and 1–2.5 cm. wide, broadly rounded at the apex, firm, evidently or obscurely reticulate, pubescent beneath, especially along the midrib, with coarse, conspicuously malpighian, appressed rufous hairs, at least a few of which commonly persist until maturity; petioles about 3–8 mm. long; flowers about 2–6 in axillary clusters, the pedicels nearly or quite glabrous, 4–8 mm. long; sepals about 4.2–5 mm. long, glabrous or nearly so, of the same texture throughout; corolla about 7.5 mm. long, its tube 2.3 mm. long; staminodes about 3.5 mm. long; anthers about 2.5–2.7 mm. long, slightly exserted; ovary short-hairy or reputedly glabrous, its style about 7 mm. long; fruit broadly ellipsoid, about 15 mm. long.

TYPE COLLECTION: *Brandegee s.n.*, Sierra de la Laguna, Cape Region, Baja California, Mexico, March 1892 (G, US).

DISTRIBUTION: Baja California, Mexico.

MEXICO: Baja California: *Brandegee s.n.*, in 1894 (US); *Purpus* 261, San Felipe, Cape Region, March, 1901 (Mo, US).

14. *Bumelia cartilaginea* sp. nov.

Frutex vel arbor parva usque ad 10 m. alta spinis brevibus axillaribus praedita, ramulis juvenilibus subtiliter rufo-sericeo-strigosis cito glabratibus; foliis firmiter chartaceis ellipticis vel anguste obovato-ellipticis, vulgo 1.5–4.5 cm. longis et 8–22 mm. latis, apice late rotundatis vel subacutis, obscure vel perspicue reticulatis, subitus praecipue secus costam pilis adpressis rufis valde decidue strigosis (pilis paucis ad maturitatem persistentibus); petiolis 2–5 mm. longis; floribus in glomerulis axillaribus 1–6, pedicellis 2–5 mm. longis glabris vel glabratibus; sepalis circiter 3–3.5 mm. longis, glabris vel pilis paucis rufis ornatis, parte basali acute circumscripta et cartilaginea, parte distali membranaceo-chartacea; corolla circiter 4.5–5 mm. longa, tubo 1.5–1.8 mm. longo, lobis suberectis; staminodiis 1.5–2 mm.

longis glabris eroso-laciniatis plus minusve cucullatis, inferne carinatis, superne complanatis plus minusve inflexis; antheris circiter 1.6–1.7 mm. longis; ovario glabro, stylo 3.7–5.2 mm. longo; fructu ignoto.

TYPE: *Salazar* 857, San Ignacio, Sinaloa, Mexico, 460 m., June 3, 1919, (US 1014209). What is evidently an isotype, also at US, bears the additional data *Montes* and *Salazar*, Arroyo del Palmar La Caña, shrub 3–4 m. high in moist shady places.

DISTRIBUTION: Sinaloa to Guerrero, Mexico.

MEXICO: Sinaloa: *Ortega* 857, La Caña, San Ignacio, in 1922 (F). Michoacán or Guerrero: *Langlassé* 995, Cuesta del Peregrino, terrain granitique, 500 m., April 15, 1899 (G). Guerrero: *Haenke* 1594, Acapulco (F, NY).

Bumelia cartilaginea has been confused with *B. peninsularis*, which has the flowers larger in all parts, with the sepals of the same texture throughout, and the staminodia not hooded. It is in some respects transitional between *B. peninsularis* and *B. verruculosa*, but it differs from the latter in its glabrous and less strongly hooded staminodia, which are erose-laciniate instead of entire-margined, in its suberect sepals and corolla-lobes, and in its soon glabrate not at all verrucose twigs. The known ranges of these three species are all quite distinct. An approach to the cartilaginous-based type of sepal so conspicuous in *B. cartilaginea* may sometimes be seen in *B. persimilis* and *B. socorensis*. It should be pointed out that the bases of the sepals do not become evidently cartilaginous until the flowers have opened; maturing buds have the sepals apparently of the same texture throughout.

15. *Bumelia verruculosa* sp. nov.

Frutex spinosus, ramulis primo rufo-tomentosis demum basibus papillatis pilorum delapsorum verruculosis; foliis lanceolato-ellipticis vel elliptico-oblongis, circiter 2.5–5 cm. longis et 1–2 cm. latis, perspicue vel obscure reticulatis, apice obtusis vel late rotundatis, primo subtus praecipue secus costam pilis adpressostrigosis mox glabratris; petiolis 2–5 mm. longis; floribus in glomerulis axillaribus circiter 3–6, pedicellis glabris vel subglabris 3–6 mm. longis; sepalis circiter 2.7–3 mm. longis, glabris vel pilis paucis rufis ornatis, parte basali firma et cartilaginea, parte terminali membranaceo-chartacea reflexa; corolla circiter 4.8–5 mm. longa, tubo 1–1.2 mm. longo, lobis reflexis; staminodiis cucullatis inflexis integris villosis circiter 1.7–2 mm. longis; antheris 1.8–2 mm. longis; ovario glabro, stylo 4–4.5 mm. longo; fructu ignoto.

TYPE: *Pringle* 6984, limestone hills, Las Palmas, near Tampico, San Luis Potosí, Mexico, March 7, 1899, 400 feet (US 1638968); isotypes at G, NY, US.

DISTRIBUTION: Known only from the type collection, San Luis Potosí, Mexico.

This species is superficially similar to *B. peninsularis* and *B. cartilaginea*, but it differs strikingly in its hooded, villous, entire-margined, inflexed staminodia, and in the persistent bases of the hairs of the twigs. It also differs in its strongly reflexed sepals and corolla-lobes, and in its known geographic distribution. Both the staminodes and the pubescence of the twigs are quite unique in the genus.

16. *Bumelia obovata* (Lam.) A. DC. in DC. Prodr. 8: 191. 1844.

Shrub or small tree commonly 2–6 m. tall, unarmed or sometimes

strongly spiny; young twigs sericeous-strigose with rufous hairs, generally soon glabrate; leaves oblanceolate to broadly ovate or suborbicular, broadly rounded and sometimes obscurely wavy at the apex, cuneate at the base, commonly 1-3.5 cm. long and 3-33 mm. wide, occasionally some of them smaller, rufous-strigose beneath when young, sooner or later subglabrate, the hairs often fading before falling; leaf-surfaces, especially the upper, having a peculiar texture due largely to the fine slightly raised irregularly reticulate striations trending parallel to the primary lateral veins, not otherwise reticulate; flowers mostly about 2-10 in axillary clusters, from subsessile to borne on pedicels as much as 10 mm. long, the pedicels rufous-strigose to glabrous; sepals glabrous or more or less strigose, about 1.2-2 mm. long; corolla about 2.7-4.3 mm. long, the tube 0.7-1.3 mm. long; anthers 0.8-1.3 mm. long; ovary hairy or subglabrous; style about 2-4.5 mm. long; fruit subglobose to sometimes ellipsoid-cylindric, black, 5-12 mm. long.

TYPE COLLECTION: None given.

DISTRIBUTION: Hispaniola and Puerto Rico through the Lesser Antilles to Curaçao and Aruba, also rarely in northern Venezuela.

16A. *Bumelia obovata* var. *typica* nom. nov.

Sideroxylon obovatum Lam. Tab. Encyc. 2: 42. 1793.

Bumelia cuneata Sw. Fl. Ind. Occ. 1: 496. 1797.

Achras cuneifolia Poir. in Lam. Encyc. Meth. 6: 534. 1804.

Sideroxylon cuneatum A. DC. in DC. Prodr. 8: 181. 1844.

Bumelia parvifolia A. DC. in DC. Prodr. 8: 190. 1844.

Bumelia obovata A. DC. in DC. Prodr. 8: 191. 1844, sens. strict.

Bumelia myrsinifolia A. DC. in DC. Prodr. 8: 192. 1844.

Bumelia obovata var. *portoricensis* Pierre in Urb. Symb. Ant. 5: 143. 1904.

Bumelia obovata var. *thomensis* Pierre, loc. cit.

Bumelia heterophylla Urb. Symb. Ant. 7: 326. 1912.

Usually essentially unarmed, only occasionally evidently spiny; pedicels mostly 2-10 mm. long, sparsely hairy or glabrous; sepals and ovary sparsely hairy or glabrous; style sometimes as much as 4.5 mm. long, often much less. Range of the species.

HAITI: Ekman H3274 (US); Nash & Taylor 1595 (NY, US). DOMINICAN REPUBLIC: Bertero s.n. (Mo, NY — fragment); Ekman 14067 (US); Fairchild 2622 (A, US); Taylor 519 (NY). PUERTO RICO: Britton 9106 (NY), 9648 (NY); Britton & Brown 6025 (NY); Britton, Cowell & Brown 4821 (NY, US), 4879 (G, Mo, NY, US); Britton, Cowell & Hess 1657 (NY, US); Britton & Shafer 1878 (NY, US); Gregory 306 (NY), 408 (PR); Hess 1668 (NY); Miller 1631 (US); Shafer 1998 (NY, US); Sintenis 3400 (G, US), 3485 (Mo, NY, US), 3546 (US), 3780 (G, US), 4814b (US). ST. THOMAS: Britton 192 (NY); Britton & Shafer 18 (NY, US); Eggers 409 (G), s.n. (Mo, NY, US); Holton s.n. (NY); Rose 3196 (NY). ST. JAN: Britton & Shafer 526 (NY, US). TORTOLA: Fishlock 136 (NY), 446 (NY, US), 447 (F); Britton & Shafer 905 (NY, US). VIRGIN GORDA: Beard 328 (A); Britton & Fishlock 1116 (NY, US). ANEGADA: Britton & Fishlock 960 (G, NY, US); Fishlock 10 (F, G, NY, US). ST. CROIX: Ricksecker 383 (G, Mo, NY, US). ST. MARTIN: Boldingh 2765 (NY). ST. BARTHOLOMEW: Forststroem s.n. (NY). BARBUDA: Box 617 (US). ANTIGUA: Box 847 (US), 1401 (A, US), 1511 (A, US). GUADELOUPE: Bertero s.n. (Mo); Duss 2909 (NY). MARTINIQUE: Duss 260 (NY). CURAÇAO: Boldingh 5312 (NY); Britton & Shafer 3109 (NY, US); Curran & Haman 88 (G, NY), 158 (A, G, US), 205 (G, NY, US); Potter 5118 (NY); Realino s.n. (Krukoff Herb.). ARUBA: Boldingh 6494 (NY); Curran & Haman 410 (G, US). BONAIRE: Boldingh 7235 (NY), 7422 (NY). VENEZUELA: Aragua: Ocumare de la Costa, Williams 12174 (US). Sucre: Paria Peninsula, Bond, Gillin & Brown 262 (NY).

16B. *Bumelia obovata* var. *Krugii* (Pierre) comb. nov.

Bumelia Krugii Pierre in Urb. Symb. Ant. 5: 146. 1904.

Strongly spiny; more hairy than var. *typica*, the twigs, pedicels, and sepals finely sericeous-strigose with rufous hairs; leaves averaging smaller than in var. *typica*; flowers subsessile, the pedicels up to about 2 mm. long; ovary uniformly short-hairy; style apparently not over 3 mm. long. Puerto Rico.

TYPE COLLECTION: Not specified, from among *Sintenis* 3472, 3473, and 4813b, "in Portorico prope Guanica in fruticetis litoralibus ad Salinas."

PUERTO RICO: Britton 9115 (NY), 9327 (NY), 9996 (NY); Britton & Boynton 8295 (NY, US); Britton & Cowell 1298 (NY); Britton, Cowell & Brown 4897 (US), 4905 (Mo, NY, US); Britton & Shafer 1837 (Mo, NY, US), 1908 (NY, US); Gregory 650 (PR); Shafer 2940 (NY, US); *Sintenis* 3472 (Mo, NY), 3473 (G, US).

Bumelia obovata may be distinguished from all others of the genus by the peculiar leaf-texture, a character which, although perhaps more readily observed than described, is as nearly constant as any in the genus. It is presumably related to *B. obtusifolia*. Except at the borders of its range, in Hispaniola and Venezuela, no other species of *Bumelia* is known to occur in its area.

The variety *Krugii* is well separated from the ordinary nearly or quite unarmed forms of var. *typica*. However, several otherwise representative specimens of the latter from Hispaniola, one from Puerto Rico, one from Curaçao, and one of the two known collections from Venezuela resemble var. *Krugii* in being more or less spiny. Most of these specimens, it will be noted, come from outside the known range of var. *Krugii*. It is possible that a third variety could be established for these plants, but in view of their very spotty distribution I am reluctant to do so without further evidence. It seems not improbable that the type of the species is of this nature, since it was originally described by Lamarck as being spiny.

17. *Bumelia glomerata* Griseb. Mem. Am. Acad. II. 8: 518. 1862.

Bumelia horrida Griseb. Cat. Pl. Cub. 165. 1866.

Bumelia microphylla Griseb. Cat. Pl. Cub. 165. 1866.

Bumelia tortuosa C. Wright ex Sauvalle, Ann. Acad. Habana 6: 288. 1870.

?*Bumelia subintegra* Urb. & Ekm. Ark. Bot. 21A(5): 56. 1927.

Bumelia Buchii Urb. Ark. Bot. 21A(5): 56. 1927.

Bumelia pachyclada Urb. & Ekm. Ark. Bot. 21A(5): 57. 1927.

Bumelia lineolata Urb. & Ekm. Ark. Bot. 22A(17): 73. 1929.

More or less spiny shrub or small tree, sometimes less than 1 m. high, sometimes reaching 12 m.; young twigs finely rufous-strigose; leaves about 3-40 mm. long and 2-17 mm. wide, elliptic or broadly oblanceolate (especially when larger) to broadly obovate or suborbicular (especially when smaller), broadly rounded at the apex, thick and smooth, mostly fascicled, strigose beneath with mostly rufous hairs when young, later glabrate, the veins, except the midrib, generally visible only as faint furrows or not at all; flowers about 1-4 in a cluster, subsessile, the rufous-hairy pedicels up to about 2 mm. long; sepals about 1.1-2.2 mm. long, glabrous or rufous-strigose; corolla about 3.1-3.8 mm. long, the tube 1.2-1.5 mm. long; stamens included, the filaments only about 1 mm. long; anthers about 0.7-1 mm. long; staminodes ovate to reniform, about 1-1.3

mm. long; ovary with flattish to broadly rounded glabrous top and short-hairy to glabrous sides, the style 0.7–1.4 mm. long; fruit dark red, subglobose, less than 1 cm. long.

TYPE COLLECTION: Wright 347, eastern Cuba (G, NY).

DISTRIBUTION: Cuba and Haiti.

This species might conceivably be divided into 3 varieties, a typical one, only slightly spiny, with relatively large leaves that have the midrib raised and visible beneath nearly to the tip, one based on *B. horrida*, strongly spiny, with smaller leaves in which the midrib visibly extends scarcely beyond the middle, and an equally spiny but coarser variety based on *B. microphylla*, with very small leaves that have scarcely discernible midrib and tend to become coppery beneath. It is entirely possible, however, that these represent mere individual responses to variations in the severity of the habitat, and I am therefore unwilling to propose the new combinations that would be necessary. The specimens have been annotated as "typical phase," "*B. horrida* phase," and "*B. microphylla* phase," and are so cited below.

Typical phase: CUBA: Isla de Pinos: Britton, Britton & Wilson 15072 (NY, US). Pinar del Río: Ekman 16577 (NY). Oriente: Ekman 6264 (NY), 7893 (NY), 9624 (A, F, US), 19184 (G, NY, US); Roig 4910 (Cu), 4992 (NY), 5185 (Cu, NY).

B. horrida phase: CUBA: Wright 1922 (NY), 2922 (G, Mo, NY, US). Isla de Pinos: Britton, Britton & Wilson 15377 (NY, US); Ekman 12335 (US). Pinar del Río: Britton & Cowell 9924 (NY); Fors 4762 (Cu); Roig 3966 (Cu). Habana: Ekman 13271 (NY); León 6010 (NY), 6256 (NY), 7172 (NY), 7591 (NY); León & Roig 11445 (NY); Wilson 13933 (NY, US). Santa Clara: Britton, Earle & Wilson 4595 (G, NY, US); Combs 734 (G, Mo, NY). Camaguey: Ekman 15478 (US). Oriente: Britton & Cowell 12705 (NY, US); Britton, Cowell & Shafer 13064 (NY, US); Ekman 2961 (US), 10204 (F). HAITI: Ekman H 10004 (US); Leonard 13267 (NY).

B. microphylla phase: CUBA: Wright 2922a (G, Mo, NY), 3623 (G). Habana: León & Roig 2522 (Cu), 8150 (Cu). Matanzas: León & Roig 4167 (Cu), 12950 (NY); Ekman 16499 (NY), 17181 (US), 18592 (US). Santa Clara: Ekman 18841 (G, NY). Oriente: Ekman 19103 (G, NY, US); Shafer 1234 (NY, US).

Bumelia subintegra Urb. & Ekm. was described as having the pubescence of the twigs spreading, instead of appressed as in *B. glomerata*, and is only doubtfully included here. I have not seen the type.

Bumelia glomerata seems to be related to *B. obovata*, the var. *Krugii* of which tends toward it. The leaves of *B. glomerata*, while differing from those of *B. obovata* in being thick, firm, smooth, and not at all veiny, as well as smaller, frequently show a suggestion of the fine raised striations so characteristic of the latter species. It is possible, however, that the relationship of *B. glomerata* is with *B. retusa* instead of with *B. obovata*, and occasional forms of *B. retusa* with spiny twigs and very small leaves are indeed difficult to distinguish from *B. glomerata*.

18. *Bumelia occidentalis* Hemsl. Biol. Centr. Am. Bot. 2: 298. 1881.

Bumelia fragrans Brandegee, Zoe 5: 106. 1901, not Ridley (1890).

Bumelia Brandegei Blake, Contr. Gray Herb. n.s. 52: 76. 1917.

Bumelia cuneifolia Jones, Contr. West. Bot. 18: 63. 1933–35.

Branching spiny shrub or small tree commonly 2–5 m. tall; leaves oblanceolate to obovate, elliptic-obovate, or rarely subrotund, tapering to the base, broadly rounded at the apex, about 8–30 mm. long and 2–20 mm. wide, scarcely or obscurely veiny, finely gray-puberulent especially beneath, eventually more or less glabrate; flowers several in axillary clusters, the pedicels about 4–20 mm. long, commonly appressed-puberulent like the leaves; sepals about 2.3–3.5 mm. long, grayish-puberulent or strigose; corolla about 4.5–5.2 mm. long, its tube 0.8–1.5 mm. long; anthers about 1.3–2.6 mm. long; style about 4.5–5.2 mm. long; fruit ellipsoid-oblong, blue-black, about 12–16 mm. long.

TYPE COLLECTION: *Coult* 934, upper Sonora, Mexico.

LOCAL NAME: *Bebelama*.

DISTRIBUTION: Baja California and Sonora, Mexico.

MEXICO: Baja California: *Brandegee s.n.* (April 9, 1889), San José de la Gracia (G, US); *Brandegee s.n.* (in 1893), Pescadero (A); *Brandegee s.n.* (May 7, 1897), San José del Cabo (G, US); *Gentry* 4264, Los Encinos, Sierra Giganta (G, Mo); *Johnston* 3904, Agua Verde Bay (A, G, Mo, NY, US); *Mason* 1866, Cape San Lucas (G, US); *Nelson & Goldman* 7245, near El Potrero (F, US); *Purpus* 319, Las Animas (Cape Region) (Mo, US); *Wiggins* 5482, north of Comondú (A). Sonora: *Coiville* 1676, Torres (US); *Ferris* 8729, San Carlos Bay, north of Guaymas (NY, US); *Johnston* 4296, San Pedro Bay (A, G, NY, US); *Johnston* 4367, San Carlos Bay (G, US); *MacDougal & Shreve* 6, west of Ceruas Well (US); *Shreve* 6054, near Santa Rosa (F); *Shreve* 6195, north of Palma, between Guaymas and Hermosillo (US); *White* 416, Tonibabi hot springs, near Moctezuma (G); *Wiggins* 6167, between San Carlos and Santa Rosa, 45 miles west of Norio (US); *Wiggins* 6482, 63 miles north of Guaymas (Mich, US); *Wiggins* 8293, San Pedro, north of Tajitos (US).

This species is related to *B. celastrina*, from which it differs in its more copious and more persistent pubescence, longer pedicels, larger flowers with longer style and anthers, larger fruit, and more western disjunct distribution. *Bumelia fragrans* Brandegee (= *B. Brandegei* Blake), with shorter, less hairy pedicels, and broader sooner glabrate leaves than usual, is surely part of this species. Further collecting may conceivably warrant its varietal recognition; the specimens now available do not.

19. *Bumelia celastrina* H.B.K. Nov. Gen. et Sp. 7: 212. 1825.

Bumelia ferox Schlecht. & Cham. Linnaea 6: 392. 1831.

Bumelia spinosa A. DC. in DC. Prodr. 8: 191. 1844.

Bumelia angustifolia Nutt. N. Am. Sylva 3: 38. 1849.

Bumelia Eggersii Pierre in Urb. Symb. Ant. 5: 146. 1904.

Bumelia Schottii Britton, N. Am. Trees 777. 1908.

Bumelia afinis Blake, Contr. Gray Herb. n.s. 53: 45. 1918.

Shrub or small tree commonly 2–9 m. tall; leaves generally fascicled, except on vigorous young shoots, glabrous from the first, or with only a few very fine and inconspicuous white hairs when young, oblanceolate to obovate or sometimes nearly elliptic, broadly rounded at the apex, generally acute at the base, mostly 1–4 cm. long and 3–25 mm. wide, occasionally a little larger, firm, the veins not very prominent, the reticulum rather obscure or indiscernible; flowers about 3–10 in a cluster, the pedicels glabrous or with a few inconspicuous white hairs, about 2–7 mm. long; corolla about 3–4.5 mm. long, the short tube only 0.8–1.2 mm. long; anthers 1–1.5 mm. long; staminodes lance-elliptic to rhombic-ovate, about 2–3 mm. long; ovary pubescent toward the base, glabrous above, the style about 2.5–4 mm.

long; fruit ellipsoid-cylindric, occasionally a little widened above, 7–13 mm. long, blue-black.

TYPE COLLECTION: *Humboldt* & *Bonpland*, "crescit in declivitate occidentali montium Mexicanorum, in convali Sopilote, inter Chilpansingo et Tasco, alt. 517 hex."

LOCAL NAMES: *Hapuche, caimito, coma, bebelamilla bagre.*

DISTRIBUTION: Southern Texas to Venezuela; Florida; Bahama Islands; Camaguey, Cuba.

MEXICO: Nuevo León: *Dodge* 96 (NY, US); *Edwards* 378 (F); *Gregg* 196 (G, Mo); *Kenoyer* 1173 (F); *Lozano* 13904 (G, Mich, US); *Pringle* 2787 (A, G, US); *Taylor* 378 (Mo). Tamaulipas: *Bartlett* 10565 (F); *Bartlett* 10833 (F); *Bartlett* 10784 (F, US); *Bartlett* 11111 (F, G, US); *Berlandier* 3048 (Mo); *LeSueur* 340 (F, G). Sinaloa: *Ortega* 6572 (US). Vera Cruz: *Müller* 1855 (NY); *Seler* 3711 (G, US); *Woronow* 2099 (F). Oaxaca: *Reko* 3677 (US); *Williams* 9907 (F). Yucatán: *Flores* 6 (F); *Gaumer* 1313 (A, F, G, Mich, Mo, NY). Chiapas: *Bossé* s.n. (F); *Matuda* 2702 (A, Mich, Mo, NY, US). GUATEMALA: San Marcos: *Steyermark* 37776 (F). Progreso: *Standley* 69035 (F); *Standley* 69042 (A, F); *Steyermark* 43859 (F). Zacapa: *Standley* 74144 (F); *Standley* 72004 (F). Retalhuleu: *Standley* 66512 (F); *Standley* 66643 (F); *Standley* 87545 (F). Chiquimula: *Steyermark* 31533 (F). EL SALVADOR: *Standley* 20864 (G, NY, US); *Standley* 21893 (G, NY, US). PANAMA: Coclé: *Pittier* 4988 (G, NY, US). COLOMBIA: Bolívar: *Heriberto* 95 (US). Magdalena: *Herbert Smith* 423 (A, G, NY, US). VENEZUELA: Isla de San Carlos: *Curran & Haman* 802 (G, NY, US). Falcón: *Curran & Haman* 534 (A, G, NY, US). BAHAMA ISLANDS: Great Bahama: *Brace* 3605 (NY); *Britton & Millspaugh* 2737 (NY). New Providence: *Britton* 6592 (NY, US); *Britton & Brace* 326 (NY); *Eggers* 4418 (A, US); *Millspaugh* 2492 (NY). Andros: *Brace* 4870 (NY); *Brace* 5291 (NY); *Brace* 6773 (NY); *Coker* 202 (NY); *Northrop* 666 (F, NY). Hog Island: *Wilson* 8317 (Mo, NY). Rose Island: *Britton & Millspaugh* 2157 (NY). Cat Cay: *Brace* 3740 (NY). South Cat Cay: *Millspaugh* 2420 (NY). CUBA: Camaguey: *Ekman* 15476 (NY, G, US); *Ekman* 15523 (NY); *Shafer* 407 (G, NY, US); *Shafer* 886 (NY, US); *Shafer* 906 (NY, US).

The plants from Florida and the West Indies have the reticulum of the leaf a little more obscure, on the average, than others of the species, and are generally totally glabrous from the first, but the differences are minor and not sufficiently constant to warrant taxonomic recognition. An immature fruiting specimen from Oriente, Cuba (*Roig* 5545 — Cu) seems nearest to *B. celastrina*, but has the young twigs evidently rufous-strigose.

20. *Bumelia conferta* (C. Wright) Pierre in Urb. Symb. Ant. 5: 144. 1904.

Sideroxylon confertum C. Wright in Sauvelle, Fl. Cub. 86. 1870.

Unarmed tree, or the young branches spiny; twigs rufous-strigose when young; leaves broadly elliptic, about 2–5 cm. long and 1.5–3.5 cm. wide, rounded or retuse at the apex, rounded or obtuse at the base, essentially glabrous from the first, not at all veiny, the primary lateral veins faint or obscure at maturity; flowers about 1–4 in a cluster, the pedicels glabrous, about 6–10 mm. long; sepals slightly strigose, becoming cartilaginous at the base; corolla (not seen by me) about 4.5 mm. long, the lateral lobes absent or vestigial; ovary short-hairy; style about 3–3.5 mm. long; mature fruit unknown, but a maturing one narrowly ellipsoid, about 9 mm. long.

TYPE COLLECTION: *Wright* 2920, in part, "a la orilla de los manglares Potrero Playitas, Bahia-Hondia," Pinar del Río, Cuba (G, NY, US — drawing). An entirely different plant, also bearing Wright's number 2920, was made the type of *Daphnopsis cuneata* Radlk. (Mo).

DISTRIBUTION: Pinar del Río and Oriente, Cuba.

CUBA: *Wright* 2928 (presumably in Pinar del Río) (G, Mo). Pinar del Río: *Ekman* 17405 (US), 17435, *Toscano* (Cu, NY, US). Oriente: Sierra Maestra, *Ekman* 9389 (A, F, G, NY, US), 14206 (NY); *León* 11022 (NY).

Bumelia conferta is closely related to *B. rotundifolia* and, at least in the herbarium, greatly resembles it, but it differs in the obsolescence of the lateral lobes of the corolla-lobes, in the more evidently hairy twigs and sepals, in having fewer flowers per cluster, and in having the leaves, on the average, less veiny. The known distribution of *B. conferta*, Oriente and Pinar del Río, Cuba, is perplexing and unexplained, but the specimens available from the two areas show no appreciable differences.

21. *Bumelia Picardae* Urb. Symb. Ant. 5: 148. 1904.

Spiny shrub about 2–3 m. tall; young twigs strigose with silvery or rufous hairs, very soon glabrate; leaves firm, oblanceolate or more commonly obovate to narrowly or broadly elliptic, obtuse or broadly rounded at the apex, more often narrowed at the base, about 6–30 mm. long and 4–15 mm. wide, silvery-strigose when young, very soon glabrate, the midrib raised beneath, the primary lateral veins visible only as faint furrows, especially beneath, or not at all, the upper surface smoother and shinier than the lower, subsessile, the petioles less than 3 mm. long; flowers about 1–3 in the axils, subsessile, the pedicels less than 2 mm. long; sepals about 1.5–2.9 mm. long, glabrous, generally green, especially toward the base; corolla about 3.2–4 mm. long, the tube 1.3–1.5 mm. long, the lobes without lateral lobes; anthers about 1–1.2 mm. long; staminodes ovate, about 1.3–1.7 mm. long; ovary short-hairy or subglabrous, the style about 1.2–1.9 mm. long; fruit narrowly ellipsoid, about 12–13 mm. long.

TYPE COLLECTION: *Picarda* 1242, "Haiti in Plaine," June (NY).

DISTRIBUTION: Haiti and the Dominican Republic.

HAITI: *Ekman* H2021 (US); *Leonard* 10003 (G, NY, US), 14718 (A, G, US), 14899 (US), 15879 (NY, US). DOMINICAN REPUBLIC: *Ekman* 15576 (US).

Urban established a separate section *Bumeliopsis* for *B. Picardae*, based on the suppression of the lateral lobes of the corolla-lobes. Three other species (and occasionally a fourth) are now known to share this character, but it is doubtful that they are sufficiently closely related to form a natural section. *Bumelia Picardae* seems related to *B. obovata*, *B. conferta* is obviously close to *B. rotundifolia*, and *B. revoluta* and *B. integra* are of doubtful affinities, perhaps allied to *B. retusa*. All of these species are probably eventually derived from and not distinctly related to *B. obtusifolia*, in which the lateral lobes are occasionally suppressed.

22. *Bumelia integra* nom. nov.

Dipholis anomala Urb. Symb. Ant. 7: 325. 1912. Not *Bumelia anomala* Clark.

Unarmed tree; leaves obovate or elliptic, obtuse or rounded at the apex, tapering to the base, about 2.5–5 cm. long and 1.5–2.5 cm. wide, short-petiolate, very finely and densely rufous-strigose on both sides at first, very soon glabrate above, more tardily so beneath, not very veiny, only the midrib and primary lateral veins evident beneath, only the midrib above; flowers in dense axillary clusters of about 5–25, subsessile, the stout rufous-strigose pedicels 2 mm. long or less; sepals nearly glabrous; corolla about 3.2 mm. long, white, the lobes double the tube, without lateral lobes;

anthers about 0.9 mm. long; ovary appressed-hairy; style about 2.5 mm. long; fruit unknown.

TYPE COLLECTION: *Fuertes 1039*, "Barahona, ad El Hoyo," Dominican Republic, 700 m., Sept., 1911 (A, G, NY, US).

DISTRIBUTION: Known only from the type collection, Dominican Republic.

This species is transferred from *Dipholis* to *Bumelia* because of its hairy ovary and because suppression of the lateral lobes of the corolla-lobes, while occurring in several species of *Bumelia*, is otherwise unknown in *Dipholis*. More certain determination of its affinities awaits the collection of fruiting material.

23. *Bumelia revoluta* Urb. *Symb. Ant.* 9: 417. 1925.

Unarmed shrub or small tree about 3-4 m. tall; young twigs strigose-puberulent with rufous hairs; leaves firm, more or less revolute, obovate to narrowly oblong, about 7-25 mm. long and 2-6 mm. wide, green and shiny above, covered beneath with a dense rufous sericeous-tomentose pubescence, which becomes thinner, paler, and more strigose in age, not at all veiny above, only the midrib evident beneath, subsessile, the petioles about 1-3 mm. long; flowers 1 or seldom 2 in the axils, the rufous-hairy pedicels about 2-4 mm. long; sepals rufous-hairy, about 2.5 mm. long; corolla (not seen by me) about 3 mm. long, the lobes without lateral lobes; ovary pubescent; fruit unknown.

TYPE COLLECTION: *Ekman 15261*, "Sierra de Nipe prope Woodfred in fruticetis carrascales ca. 500 m.," Oriente, Cuba, September (NY).

DISTRIBUTION: Oriente, Cuba.

CUBA: Oriente: *Ekman 4034* (US); *Shafer 3181* (NY).

DOUBTFUL AND EXCLUDED SPECIES

Bumelia amazonica Krause, *Notizbl. Bot. Gart. Berlin* 6: 170. 1914. Dubious; possibly a *Pouteria*; type-photo seen.

Bumelia ambigua Ten. *Sem. Hort. Neap.* 1827. Nom. dub.

Bumelia argentea Roem. & Schult. *Syst.* 4: 499. 1819 = *HEERIA ARGENTEA*.

Bumelia Auzuba Roem. & Schult. *I.c.* = *MASTICHODENDRON* sp.

Bumelia borbonica Lodd. ex Loud. *Hort. Brit.* 69. 1830. Nom. dub.

Bumelia crenulata Spreng. *Syst.* 1: 665. 1825. Apparently not sapotaceous.

Bumelia cuneifolia Rudge, *Pl. Guian.* 1: 30. 1805 = *CHRYSOPHYLLUM CUNEIFOLIUM*.

Bumelia denticulata Raf. *New Fl. Am.* 3: 29. 1836. Not sapotaceous.

Bumelia depressa Urb. & Ekm. *Ark. Bot.* 22A(17): 73. 1929. Not sapotaceous.

Bumelia dulcifica Schum. & Thonn. *Beskr. Gui. Pl.* 130. 1827 = *POUTERIA DULCIFICA*, according to Baehni.

Bumelia foetidissima Willd. *Sp. Pl.* 1: 1086. 1797 = *MASTICHODENDRON* sp.

Bumelia laurifolia Standl. *Trop. Woods* 18: 31. 1929 = *POUTERIA AMYGDALINA*.

Bumelia lucida Roem. & Schult. *Syst.* 4: 499. 1819. Nom. dub.

Bumelia macrantha Willd. ex Roem. & Schult. *Syst.* 4: 802. 1819 = *ARDISIA* sp.

Bumelia Manglillo Willd. *Sp. Pl.* 1: 1087. 1797 = *MYRSINE MANGLILLO*.

Bumelia Mastichodendron Roem. & Schult. *Syst.* 4: 493. 1819 = *MASTICHODENDRON* sp.

Bumelia multiflora Roem. & Schult. *Syst.* 4: 498. 1819. Not sapotaceous.

Bumelia nervosa Vahl. Eclog. Am. 1: 28. 1796 = *POUTERIA MACROPHYLLA*.

Bumelia pallida Sw. Prodr. Veg. Ind. Occ. 49. 1788 = *MASTICHODENDRON* sp.

Bumelia pauciflora Roem. & Schult. Syst. 4: 493. 1819 = *MASTICHODENDRON* sp.

Bumelia pubescens Ten. Sem. Hort. Neap. 1827. Nom. dub.

Bumelia punctata Roem. & Schult. Syst. 4: 498. 1819. Not sapotaceous.

Bumelia serrata Pursh, Fl. Am. Sept. 1: 155. 1814 = *PRUNUS CAROLINIANA*.

Bumelia serrulata Raf. New Fl. Am. 3: 29. 1836. Not sapotaceous.

Bumelia strigosa Spreng. Syst. 1: 665. 1825. Nom. dub.

Bumelia undulata Raf. New Fl. Am. 3: 28. 1836. Probably not sapotaceous.

NEW YORK BOTANICAL GARDEN,

NEW YORK.

NOTES ON SOME CULTIVATED TREES AND SHRUBS, II*

ALFRED REHDER

***Juglans nigra* L. f. *laciniata*, f. *nova*.**

Juglans nigra laciniata J. Hershey, Price list Nut Tree Nurseries p. 4 [1937] "Cut Leaf Black Walnut," cum descr. angl.; p. 6 [1940] "*J. Laciniata*"; p. 8 [1941] "*J. Nigra Laciniata*," nom.

A typo speciei differt foliis bipinnatis, foliolis primi ordinis pinnatis, pinnulis utrinque 5-8 oblongo-lanceolatis vel lanceolatis serratis vel interdum plus minusve raro fere ad medium pinnatifidis basi decurrentibus, pinnula terminali pinnatifida vel plus minusve serrata.

CULTIVATED SPECIMENS: Arnold Arboretum, no. 309-41, E. J. Palmer, Sept. 8, 1944 (plant received in 1941 from H. F. Stoke, Roanoke, Va.).

A very distinct form with bipinnate leaves finely dissected into lanceolate to linear-lanceolate and serrate to pinnatifid leaflets 1-3.5 cm. long and 4-11 mm. wide. In the shape of its foliage and in general appearance this form resembles somewhat *Rhus typhina* f. *dissecta* Rehder, but it is more finely dissected and more graceful; the tree certainly merits attention as a highly ornamental form.

With the exception of the laciniate form of the English Walnut, *Juglans regia* f. *laciniata* (Jacques) Schneider, no other form with lacinate leaflets was known in the whole family until the form of *J. nigra* described above was raised. The cut-leaved form of the English Walnut, from which *J. regia* f. *heterophylla* (Jacques) Schneider differs but little, is distinctly inferior as an ornamental plant to the cut-leaved Black Walnut, having a rather coarse, very irregularly shaped foliage, and moreover being more tender.

According to information kindly furnished by Mr. J. W. Hershey, the owner of the Nut Tree Nurseries at Downingtown, Pa., about thirty plants of this form were found in 1926 at the State Nursery at Milton, Pa., among seedlings raised from seed collected from normal Black Walnut trees in Buffalo Valley, east of the State Nursery. Unfortunately most of the seedlings got lost, but Mr. Hershey obtained one plant and, recognizing its ornamental value, propagated it so that he was able in 1937 to offer it for sale. The Arnold Arboretum received in 1941 a plant of this form from Mr. H. F. Stoke of Roanoke, Va., with the statement that it originated in Pennsylvania; this was probably obtained from the same source as Mr. Hershey's plant.

***Juglans cordiformis* Maxim. var. *ailantifolia* (Carr.), comb. nov.**

Juglans Sieboldiana Maximowicz in Bull. Acad. Sci. St. Pétersb. 18: 61 (in Mél. Biol. 8: 63) (1873).—Miyabe & Kudo, Icon. For. Trees Hokk. 65, t.20 (1922).—Non Goepert (1854), fossil.

* For no. I see p. 67 of this volume.

Juglans ailantifolia Carrière in Rev. Hort. 1878: 414, fig. 85-86 (1878). — Little in Jour. Washington Acad. Sci. 33: 132 (1943).

Juglans macrophylla Carrière in op. cit. 415 (1878).

Juglans japonica Hort. ex Lavallée, Arb. Segrez. Icon. 1 [1880], pro syn.

Juglans ailantifolia var. *cordiformis* (Maxim.) Rehder in Jour. Arnold Arb. 26: 68 (1945).

When Little in 1943 (l. c.) drew attention to the fact that *J. Sieboldiana* Maxim. was antedated by *J. Sieboldiana* Goeppert of 1854 and took up the name *J. ailantifolia* Carr. for the species, I accepted his disposition and, considering *J. cordiformis* Maxim. a variety of *J. Sieboldiana*, I published the combination *J. ailantifolia* var. *cordiformis*, overlooking the fact that *J. cordiformis* Maxim. of 1873 has priority over *J. ailantifolia* Carr. of 1878 and should have been taken up when *J. Sieboldiana* Maxim. was invalidated by the older homonym of Goeppert. As there can be little doubt that *J. cordiformis* Maxim. and *J. Sieboldiana* Maxim. are conspecific and represent only variations in the shape of the fruit, the name *J. cordiformis* has to be taken up when *J. Sieboldiana* is rejected, which makes necessary the new combination proposed above. If, however, *J. cordiformis* and *J. Sieboldiana* Maxim. should be considered distinct species, the latter would become *J. ailantifolia* Carr.

Ulmus parvifolia Jacq. f. *pendens*, f. *nova*.

A typo recedit ramis elongatis laxe pendulis.

CULTIVATED in California: City Park, Covina, Los Angeles Co., southwest corner of 4th Street and San Bernardino Road, tree with trunk 3' 9" in circumference, with the head 50' across, coll. C. R. Tower, Oct. 1944 (TYPE in herb. Arnold Arb. with photo. of habit); same locality, coll. C. R. Tower, Sept. 1944 (in herb. Arnold Arb.); John Galvin Park, Ontario, San Bernardino Co., coll. C. R. Tower, Sept. 1944, with photo. of habit showing a wide-spreading tree with somewhat less pendulous branches than the type tree (in herb. Arnold Arb.). There are also photographs in the collection of the Arnold Arboretum of this form from North Clementine St., Anaheim, Orange Co., and from the Roy F. Wilcox Nursery in Montebello, near Los Angeles.

The bark of the trunk and larger limbs is rather thin and scaly, the scales, when shedding, exposing a smooth lenticellate pale reddish layer of bark. The leaves are subcoriaceous, oblong-lanceolate, 3.5-5 cm. long and 9-20 mm. broad, acute or acuminate, unequal at the base, cuneate on one side and subcordate to rounded on the other. The photographs listed above show trees with a large spreading head to fifty feet wide or more, more or less flattened at the top without upright or ascending leaders, but with long and slender pendulous branches and branchlets.

This pendulous form raised in California (together with the typical form from seed received about twenty-five years ago from China) seems to be an unusual form in China, for the several photographs in our collection of *U. parvifolia*, taken in different parts of China, show trees of upright habit except in a photograph of trees taken in the grounds of the Temple of Heaven near Peking, which shows rather wide-spreading but not pendulous branches.

The epithet "pendens" has been chosen for this form to avoid confusion with *Ulmus parvifolia pendula* Hort. ex Dippel, Handb. Laubh. 2: 27

(1892), pro syn., a name which apparently had been used in nursery catalogues before Dippel cited it as a synonym of a form of *U. pumila* L.

Clematis traternata DC. f. *rubro-marginata* (Jouin), comb. nov.

Clematis rubro-marginata Jouin in Mitt. Deutsch. Dendr. Ges. 1907(16): 236 (1907).

Clematis Flammula var. *rubro-marginata* Cripps ex Jouin, l. c. (1907), pro syn.

Clematis violacea var. *rubro-marginata* Rehder in Jour. Arnold Arb. 1: 195 (1920); Man. Cult. Trees Shrubs, ed. 2, 217 (1940).

According to Graebner f. in Ascherson & Graebner, Syn. Mitteleur. Fl. 5,3: 65 (1935), *C. traternata* DC. [1817] is identical with *C. violacea* A. DC. (1845), which makes necessary the transfer proposed above.

×*Spiraea Bumalda* Burvenich f. *pruhoniciana* (Kriechb.), Comb. nov.

×*Spiraea pruhoniciana* Kriechbaum in Gartenschönh. 6: 38 (1925) "S. japonica ovalifolia" × *Bumalda* "Anthony Waterer," nom. subnud. — Zeman ex Schneider in Silva Tarouca & Schneider, Uns. Freil.-Laubgeh. ed. 3, 433 (1931).

Spiraea pruhoniciana, being a hybrid between the same species as *S. Bumalda* (*S. japonica* × *albiflora*), though between different varieties or forms, cannot be classed under a separate binomial, but falls into the group of hybrids between *S. japonica* and *S. albiflora*.

Sorbus Aria f. *longifolia* (Pers.), comb. nov.

Crataegus Aria β. *foliis oblongis* Lamarck, Encycl. Méth. Bot. 1: 82 (1783). — Poiret in Duhamel, Traité Arb. Arbust. France, éd. augm. [Nouv. Duhamel] 4: 129, t. 34 [1809] "C. Aria" in tab.

Pyrus Aria β. *longifolia* Persoon, Syn. Pl. 2: 38 [1806].

Pyrus edulis Willdenow, Enum. Pl. Hort. Berol. 527 (1809).

?*Pyrus Aria* β. *acutifolia* De Candolle, Prodr. 2: 636 (1825).

Crataegus longifolia "Duham. ed. nov. 4. t.34" [1809] ex De Candolle, l. c. (1825), pro syn.

Aria edulis Roemer, Fam. Nat. Reg. Veg. Syn. 3: 124 (1847).

Sorbus edulis K. Koch, Dendr. 1: 195 (1869).

Sorbus Aria var. *edulis* Wenzig in Linnaea, 38: 54 (1874). — Schneider, Ill. Handb. Laubh. 1: 687, fig. 377h-i (1906). — Rehder, Man. Cult. Trees Shrubs. ed. 2, 380 (1940).

Hahnia Aria f. [letter] *edulis* Dippel, Handb. Laubh. 3: 375 (1893).

Hahnia Aria i. *angustifolia* Dippel, op. cit. 376 (1893), vix *Pyrus Aria angustifolia* Lindley (1827).

Sorbus longifolia Hedlund in Svenska Vetensk.-Akad. Handl. 35,1: 82 (Monog. Sorbus) (1901).

Pirus Aria A. I. a. *edulis* Ascherson & Graebner, Syn. Mitteleur. Fl. 6,2: 95 (1906).

If the two slightly differing forms with the epithet "*longifolia*" and those with the epithet "*edulis*" are united as is done, apparently with good reason, by Hedlund and by Ascherson & Graebner, the epithet of Persoon's name as the oldest will have to be accepted and makes necessary the new combination proposed above.

Rosa centifolia f. *Andrewsii*, nom. nov.

Rosa muscosa simplex Andrews, Roses, 1: t. [58] [1810]. — Seringe, Mus. Helv. Hist. Nat. 1: 18 [1818].

Rosa muscosa (*Muscosa simplex*) Thory in Redouté, Roses, 1: 39, t. (1817).

This rose, the single-flowered form of the Moss Rose, was raised in the garden of the Countess de Vanda at Bayswater, England, and flowered there first in 1807, according to Miss Willmott's *Genus Rosa* (2: 347 [1912]).

It seems at present rare in gardens, and in our herbarium we have only a single specimen of this form from the garden of John Robinson, Salem, Mass., collected in 1889.

Rosa Koehneana (*R. carolina* × *rugosa*), nom. nov.

Rosa humilis × *rugosa* Koehne, Deutsche Dendr. 294 (1893), sine descr. — R. Keller in Ascherson & Graebner, Syn. Mitteleur. Fl. 6,1: 308 (1902), sine descr. — Willmott, Gen. Rosa, 1: 203, t. (fl.); t. (fr.) [1911].

Rosa rugosa × *carolina* Rehder, Man. Cult. Trees Shrubs, 442 (1927); non Graebner (1902) = *R. Spaethiana* Graebn. [*R. palustris* × *rugosa*].

As almost all of the hybrids of *R. rugosa* have received binary names, this characteristic and ornamental hybrid also seems worthy of a name and may be named *R. Koehneana* for E. Koehne, the author of Deutsche Dendrologie and many other important contributions to dendrology, who first listed it, though without description.

Prunus avium f. *fastigiata* (Poiteau), comb. nov.

Cerasus avium *fastigiata* Poiteau & Turpin in Duhamel, Traité Arb. Fruit. 2: C. no. 5; t. 298, fasc. 50? [1828]. — Poiteau, Pomol. Franç. 1: 185, t. 298 (1838-46).

Prunus vel *Cerasus avium* *pyramidalis* Hort. ex Dippel, Handb. Laubh. 3: 615 (1893), nom. altern.

Prunus avium lus. *pyramidalis* Ascherson & Graebner, Syn. Mitteleur. Fl. 6,2: 152 (1906).

This form was first observed in the garden of F. Cels near Paris in 1808 by Poiteau (l. c.), who describes it as a tree similar in habit to the Lombardy Poplar and bearing small yellow fruit. Whether Dippel's *Prunus avium* *pyramidalis* (l. c.) belongs here or represents another form of similar habit is doubtful, since he does not mention the color of the fruit and calls it a pyramidal form.

Prunus Vanioti H. Léveillé in Bull. Acad. Intern. Géog. Bot. 25: 45 (1915) "Prunus (Padus) Vanioti"; Cat. Pl. Yun-Nan, 234 (1917).

Prunus pubigera var. *Prattii* Koehne in Sargent, Pl. Wilson. 1: 67 (1911).

?*Prunus pubigera* var. *longifolia* Cardot in Notul. Syst. Herb. Mus. Hist. Nat. 4: 24 (1920).

?*Prunus Ohwii* Kanehira & Hatusima in Kanehira, Formos. Trees, 270, fig. 220 (1936); in Trans. Nat. Hist. Soc. Formosa, 29: 156 (1939), pro syn. "P. Ohwi."

CHINA. Szechuan: A. E. Pratt 94 (syntype of *P. pubigera* var. *Prattii*); R. P. Farges, distr. Tchen-keou-tin; E. H. Wilson 2845 (syntype of *P. pubigera* var. *Prattii*); C. Schneider 1284, 1286, 3534; W. P. Fang 4159, 7315; F. T. Wang 21122, 22865, 23302; T. T. Yu 530, 613. Kansu: J. F. Rock 14857, 14883. Hupeh: E. H. Wilson 181 and 2337 (syntypes of *P. pubigera* var. *Prattii*). Yunnan: J. M. Delavay, Ma-eul-chan, in 1891 (type of *P. pubigera* var. *longifolia*, not seen); E. E. Maire, Ma-Kong, in 1912 (ISOTYPE of *P. Vanioti*); C. Schneider 2093, 3340; G. Forrest 19511, 21132, 23080; J. F. Rock 3409, 3578, 3649, 3995, 4025, 4461, 5758, 6782, 8305, 8838, 10230, 17200, 23381. Southeast Tibet: G. Forrest 19002; J. F. Rock 22084. FORMOSA: Ohwi 3591 (type of *P. Ohwii*, not seen).

Of the three varieties of *P. pubigera* (Schneid.) Koehne distinguished by Koehne, the var. *Prattii* is identical with *P. Vanioti* H. Lév., which is the correct name for *P. pubigera*, since the latter is invalidated by the earlier homonym *P. pubigera* Steudel. Thus *P. pubigera* var. *Prattii* represents the typical variety of *P. Vanioti*, and typical *P. pubigera* (= *P. pubigera*

var. *Potanini*) becomes a variety of *P. Vanioti*. As the list of specimens cited above shows, typical *P. Vanioti* is the most widely distributed of the three varieties which have been distinguished. There can be little doubt that *P. pubigera* var. *longifolia* Cardot, judging from the brief description and the region where it was collected, belongs to typical *P. Vanioti*. As to the Formosan *P. Ohwii* Kanehira, the figure published by Kanehira agrees well with *P. Vanioti* and the identification of the species by Kanehira and Hatusima with *P. pubigera* also shows that *P. Ohwii* belongs with this affinity; its widely separated locality is not as strange as it may seem, for there are other plants known as occurring in Formosa and Yunnan, and not in the intervening region, of which the most striking example is perhaps *Taiwania cryptomerioides* Hay. (see Wilson in *Jour. Arnold Arb.* 7: 58. 1926).

Prunus Vanioti var. *obovata* (Koehne), comb. nov.

Prunus pubigera var. *obovata* Koehne in Sargent, *Pl. Wilson*. 1: 68, 196 (1911).—Rehder & Wilson in Sargent, *Pl. Wilson*. 3: 425 (1917).

CHINA. Szechuan: *E. H. Wilson* 1045 (SYNTYPE), 4036, 4185, 3521 (Veitch Exp.). Hupeh: *E. H. Wilson* 186 (SYNTYPE). Chekiang: *R. C. Ching* 1385. Kiangsi: *E. H. Wilson* 1675.

This variety extends east to Chekiang and Kiangsi and is not found in Yunnan; it apparently represents the northeastern extension of the species.

Prunus Vanioti var. *Potanini* (Koehne), comb. nov.

Padus brachypoda (Batal.) Schneid. var. *pubigera* Schneider in *Repert. Sp. Nov. Reg. Veg.* 1: 70 (1905); *Ill. Handb. Laubh.* 1: 638 (1906).

Prunus pubigera Koehne in *Verh. Bot. Ver. Brandenb.* 52 (1910): 106 (1911); in Sargent, *Pl. Wilson*. 1: 67 (1911).—Rehder in *Jour. Arnold Arb.* 13: 320 (1932); *Man. Cult. Trees Shrubs*, ed. 2, 478 (1940).—Non Steudel (1841).

Prunus pubigera var. *Potanini* Koehne in Sargent, *Pl. Wilson*. 1: 68 (1911), 196 (1912).

CHINA. Szechuan: Southeast of Tachien-lu, *E. H. Wilson* 988, June and Sept. 1908 (SYNTYPE), 4133, Oct. 1910. Northern Tibet: River Pa-sin-kou (Pa-seng-kou), above the village Tshzhumse (also spelled Tchumse¹), *G. N. Potanin*, July 1893 (SYNTYPE, not seen).

The area of this variety seems to be restricted to the extreme north-western part of the range of the whole species and extends from the region near Tachien-lu to northeastern Tibet.

This variety, partly based on Potanin's specimen, includes the type of *Prunus pubigera* (Schneid.) Koehne, originally described as *Padus brachypoda* var. *pubigera* Schneider and based on Potanin's specimen which had been, according to Schneider, identified as *Padus cornuta*. When Koehne (l. c.) raised Schneider's variety to specific rank, he overlooked the older homonym of Steudel, *Nomencl. Bot.* ed. 2, 2: 404 (1841) based on *Prunus pubescens* Poiret, *Encycl. Méth. Bot. Suppl.* 4: 584 (1816), a later homonym of Pursh, *Fl. Am.* Sept. 1: 331 (1814). Poiret's name is validly published with a full description and the statement that the plant is cul-

¹ By Schneider, l. c. (1905) the name of the village is spelled Chusme, apparently a mistake or misprint; Komarov in his account of Potanin's travels (in *Act. Hort. Petrop.* 34(2): 359, 1928) spells it Tshzhumse.

tivated in the Paris botanic garden and that its origin is unknown. It may be near or identical with *P. maritima* Marsh., which is mentioned by Poiret on p. 58 as *P. sphaerocarpa* Michx. with the synonym *P. pubescens* Pursh, but without seeing a specimen of Poiret's plant definite identification is not possible. In 1846 Heynhold, in his *Nomencl. Bot. Hort. 2*: 564, renamed Poiret's homonym *P. Poiretiana*.

Leguminosae subfam. Lotoideae (Luerssen), comb. nov.

Papilionaceae Scopoli, Fl. Carniol. 522 (1760, pref. Jun.). — Linnaeus, Philos. Bot. 37 (1763), nom. subnud. — Giseke, Praelect. Ord. Nat. Pl. 415 (1792). — Link, Handb. Erkenn. Gew. 2: 143 (1831). — Nom. CONSERV. cf. Syn. Propos. Sixth Intern. Bot. Congr. 64 (1935) et Proc. Sixth Intern. Bot. Congr. 1: 358 (1936).

Leguminosae ord. *Papilionaceae* R. Brown in Flinders, Voy. Terra Austral. 2 (App.): 552 (1814) "trib. *Legum.* ord. *P.*" — De Candolle, Prodr. 2: 94 (1825) "subord." — Lindley, Introd. Nat. Syst. Bot. 89 (1830) "trib." — Bentham & Hooker f., Gen. Pl. 1: 437 (1867) "subord."

Fabaceae Reichenbach, Handb. Nat. Pflanzensyst. 227 (1837). — Small, Fl. Southeast. U. S. 593 (1903).

Leguminosae fam. *Papilionatae* A. Braun in Ascherson, Fl. Prov. Brandenb. 67 (1864); Ascherson, Verz. Phaner. Gefässkr. Berlin 35 (Fl. Prov. Brandenb. pt. 2) "Fam. *P.*" pref. 1859 (1864). — Taubert in Nat. Pflanzenfam. III. 3: 184 [1892].

Papilionaceae subfam. *Lotoideae* (p. 379), subfam. *Hedysaroideae* (p. 380), subfam. *Vicioideae*, subfam. *Phaseoloideae* (p. 381) Luerssen, Grundzüge Bot. 379-381 (1877).

Leguminosae subfam. *Papilionoideae* Robinson & Fernald in Gray, Man. Bot. N. U. S. ed. 7, 500 (1908).

According to Art. 24 of the Rules of Botanical Nomenclature, names of subfamilies are taken from the names of one of the genera of the group with the ending -oideae. This excludes names of subfamilies such as *Papilionaceae*, *Papilionatae* and also *Papilionoideae* since they are not derived from the name of a genus of the group and the first two do not end in -oideae. Of the four subfamilies into which Luerssen divides the family *Papilionaceae*, forming in his arrangement together with the *Mimosaceae* and *Caesalpiniaceae* the order of *Leguminosae*, the name of the first and largest has been selected here as the name in an enlarged sense for the whole group considered by Luerssen as constituting the family *Papilionaceae*.

Adenocarpus decorticans Boissier in Bibl. Univ. Genève, n. sér. 13: 40 (Notice Ab. Pinsapo, 9) (March, 1838); Elench. Pl. Nov. Hisp. 32 (1838) "in bibl. univ. gen. febr. 1836" sphalm. pro 1838; Voy. Bot. Esp. 145, t. 41 (1839). — Willkomm & Lange, Prodr. Fl. Hisp. 3: 462 [1877].

Adenocarpus Boissieri Webb, Iter. Hisp. 52 (1838).²

Owing to a misprint or lapsus calami in Boissier's *Elenchus* of June, 1838, the publication of *Adenocarpus decorticans* has always been quoted without exact citation as "febr. 1836" which is obviously an error; there is no article by Boissier in the *Bibliothèque universelle de Genève* for the year 1836, and moreover, at that time he had not yet discovered the species, since he did not start his voyage through Spain until April, 1837. The first description of the species appeared in the February issue for 1838 of the

² Webb's synonym is only a renaming of Boissier's species, because he objected, for grammatical reasons, to the use of the present participle in the specific epithet.

Bibliothèque universelle de Genève (nouv. sér. vol. 13) in a list of nineteen (nos. 1-18) new species appended to his "Description d'une nouvelle espèce de sapin du midi de l'Espagne" (op. cit. 401-410), in which *Abies Pinsapo* is described. This appended list has been omitted from the reprint which appeared under the title "Notice sur l'*Abies Pinsapo*" in Ann. Sci. Nat. Bot. sér. 2, 9: 167-172 (1838). The omission of this list of nineteen names of new species from the reprint in Ann. Sci. Nat. Bot. may have been one of the reasons that their original publication was overlooked in almost all cases and not given in Index Kewensis, where they are mostly credited to Boissier's Elenchus published about three months later with amplified descriptions and some changes, but without exact citation of their previous publication, only referred to as "bibl. bot. gen. (febr. 1838)." Apparently Boissier had sent the manuscript of his Elenchus to the printer before he had seen the February issue of 1838 of the Bibliothèque universelle de Genève; otherwise he certainly would have given the exact citation for his new species. As it seems important to make available the correct record of these overlooked names, they are given in their original sequence in the following list with the addition of the citation from his Elenchus and in some cases with other additional notes.

LIST OF NEW SPECIES PUBLISHED BY BOISSIER IN THE FEBRUARY ISSUE
OF VOL. 13 (1838) OF BIBLIOTHÈQUE UNIVERSELLE DE GENÈVE

The citation of these species in his Elenchus reads "febr. 1838," which refers evidently to the February issue and not to the date of publication, since that issue contains on p. 426-427 meteorological observations up to February 28 and therefore could not have been published before March.

1. *Abies Pinsapo* Boissier in Bibl. Univ. Genève, nouv. sér. 13: 402, 406 (March 1838); Elench. 84 (June 1838).
2. *Ranunculus acetosellaefolius* Boissier in op. cit. 406 (March 1838); Elench. 5 (June 1838).
3. *Vella spinosa* Boissier in op. cit. 407 (1838); Elench. 14 (1838).
3. *Alyssum longicaule* Boissier in op. cit. 407 (1838) = *Ptilotrichum longicaule* Boissier, Elench. 13 (1838).
4. *Lavatera oblongifolia* Boissier in op. cit. 407 (1838); Elench. 24 (1838).
5. *Adenocarpus decorticans* Boissier in op. cit. 407 (1838); Elench. 32 (1838).
6. *Adenocarpus grandiflorus* Boissier in op. cit. 407 (1838); Elench. 32 (1838), pro syn. = *A. Telonensis* DC.
7. *Genista versicolor* Boissier in op. cit. 408 (1838); Elench. 31 (1838).
8. *Anthyllis tejedensis* Boissier in op. cit. 408 (1838); Elench. 35 (1838).
9. *Leobordea lupinifolia* Boissier in op. cit. 408 (1838); Elench. 36 (1838).
10. *Geum heterocarpum* Boissier in op. cit. 408 (1838); Elench. 40 (1838).
11. *Saxifraga gemmulosa* Boissier in op. cit. 409 (1838); Elench. 43 (1838).
12. *Eryngium glaciale* Boissier in op. cit. 409 (1838); Elench. 44 (1838).
13. *Lonicera arborea* Boissier in op. cit. 409 (1838); Elench. 55 (1838).
14. *Artemisia granatensis* Boissier in op. cit. 409 (March 1838); in De Candolle, Prodr. 7: 298 (April 1838); Elench. 60 (June 1838).
15. *Gentiana Boryi* Boissier in op. cit. 410 (1838); Elench. 65 (1838).
16. *Sideritis glacialis* Boissier in op. cit. 410 (1838) = *Sideritis scordioides* var. *vestita* Boissier, Elench. 76 (1838).
17. *Holcus caespitosus* Boissier in op. cit. 410 (1838); Elench. 86 (1838).

18. *Festuca Lasto* Boissier in op. cit. 410 (1838); Elench. 92 (1838) "febr. 1832" sphalm.; "loc. et nom. vulg. excluso" pro syn. = *F. altissima* Boissier, non Allioni (1789) = *F. Boissieri* Janka in Oester. Bot. Zeitschr. 14: 341 (1864) = *F. drymea* B. Boissieri Ascherson & Graebner, Syn. Mitteleur. Fl. 2,1: 535 (1900).

Robinia leucantha, spec. nov.

Frutex ad 0.5 m. altus, laxe ramosus, stolonifer, ramulis hornotinis glabris vel basin versus glandulis stipitatis et setis tenuibus sparse obsitis, annotinis et vetustioribus brunneis lenticellatis inermibus vel partim spinis stipularibus 1-3 mm. rarius ad 1 cm. longis et gracilibus armatis. Folia ab initio glaberrima vel errumpentia pilis sericeis caducis vestita mox glabra, 7-11-foliolata, vel in turionibus ad 15-foliolata; petioli 2-4 cm. longi; foliola breviter petiolulata, ovali-ovata, 2-4 (rarius ad 6) cm. longa et 1.2-2 cm. lata, terminale interdum ad 3 cm. lata, apice rotundata et emarginata vel obtusa, mucronulata, basi truncata, rarius late cuneata, in ramulis robustioribus oblongo-ovata et saepius acutiuscula, subtus pallida, venis utrinsecus 5-7, stipellis petiolulis subaequifloris. Racemi 2-5 (rarius ad 8) cm. longi, 3-6-flori, rarius ad 8- vel 10-flori; pedicelli 4-6 (rarius ad 10) mm. longi, ut rhachis sparse glanduloso-setosi; calyx campanulatus, sparse glanduloso-pilosus et plus minusve puberulus vel villosulus, pallide viridis, apicem versus albescens, leviter bilabiatus, labio supero ad medium bifido, inero 3-lobato, lobis tubo subaequifloris 5-6 mm. longis triangulare-ovatis et plerumque longe acuminatis; corolla candida, ad 2.5 cm. longa, vexillo rotundato circ. 2 cm. diam. emarginato basi cordato, unguis 4-5 mm. longo, alis inaequaliter obovatis 15 mm. longis, auricula basali 2 mm. longa, unguis 7 mm. longo, carina 1.4 mm. longa, unguis 7 mm. longo; tubus staminalis 14 mm. longus; stylus recurvatus, apicem versus villosus; ovarium leviter complanatum, dense stipitato-glandulosum. Fructus non visus.

Affinis *R. nanae* Elliott sed foliis et ramulis glabris, corolla candida facile diagnoscitur.

NORTH AMERICA: Georgia: 6 miles west of Dahlonega and near Dahlonega and 4 miles west of Porter Springs, Lumpkin Co., W. W. Ashe, May 18, 1926 (4 specimens in W. W. Ashe Herb., Univ. N. Carol.). CULTIVATED: Hort. W. W. Ashe, 1512 Park Ave., Washington, D. C., June 24, 1928 (sterile) and May 25, 1931, W. W. Ashe, W. W. Ashe Herb., Univ. N. Carol.); Kelsey Nursery, East Boxford, Mass., H. P. Kelsey, June 17, 1943; A. Rehder, June 18, 1945 (Herb. Arnold Arb., TYPE).

This new species seems to be most closely related to *R. nana* Elliott, which belongs to a group of shrubby species with glandular ovary and pink or rose-colored to purple flowers (*Hispidae* Rydb.); it differs strikingly from these species in its pure white flowers and from *R. nana* also in its glabrous leaves and branchlets. Judging from specimens in Ashe's herbarium, now at the University of North Carolina in Chapel Hill, kindly loaned to the writer by Prof. W. C. Coker, this species was first collected in Lumpkin Co., Georgia, by Ashe, who transplanted it to his garden in Washington and later sent a plant to Mr. Harlan P. Kelsey, suggesting that this new species might be named after him; he apparently overlooked the fact that there was already a *Robinia Ashei* described in 1923 by Schallert in *Torreya*. The epithet *leucantha* proposed here for this species is intended to call attention to the fact that white flowers are unusual in the

group *Hispidae*, the only plant with white or partly white flowers referred to this group being *R. albicans* Ashe, which is apparently a hybrid of *R. Pseudoacacia* and *R. Boytoni* Ashe. The possibility that the plant described above might also be a hybrid with *R. Pseudoacacia* is excluded by its low stoloniferous habit and the densely glandular ovary.

The description of this new species is based chiefly on the living specimens from the Kelsey nursery at East Boxford, Mass., where it has been growing since 1927. These specimens have the leaves and young branchlets quite glabrous from the beginning and the calyx sparingly stipitate-glandular with the lower lobes long-acuminate and slightly longer than the tube; the branches are mostly unarmed or occasionally with short conical stipular spines. The specimens from Ashe's garden do not seem to be different, but the spontaneous specimens from Lumpkin County show some slight variation. The specimen from Porter Springs has the calyx rather densely villous and, like the rachis, lacking glandular-setose hairs, while the spines are slenderer and up to 5 mm. long; one of the specimens collected six miles west of Dahlonega has the pubescence of the calyx and rachis similar to the preceding specimen and pedicels only about 4 mm. long, while the other specimen has the calyx and rachis sparingly glandular-setose, the pedicels up to 10 mm. long, and the unfolding leaves silky-pubescent but soon becoming quite glabrous; the specimen from near Dahlonega has the unfolding leaves pubescent like the preceding, the calyx rather densely villous and almost without glandular setae, the rachis sparsely glandular-setose, and slender spines up to 10 mm. long. The flowers of all these specimens are apparently white, but on the labels there is no reference to the color of the flowers nor to the habit of the plants. As the differences between the several specimens are only slight and more or less intergrading, and as all the specimens are from a rather restricted area, they must be considered conspecific, representing an otherwise well defined species.

Vitis quinquangularis, nom. nov.

Vitis pentagona Diels & Gilg in Bot. Jahrb. 29: 460 (1900).—Rehder in Sargent, Pl. Wilson. 3: 428 (1917).—Non Voigt (1845), nec M. A. Lawson (1875).

Vitis Coignetiae sensu Diels in Bot. Jahrb. 29: 461 (1900), non Planchon (1883).

Vitis ficifolia var. *pentagona* Pampanini in Nuov. Giorn. Bot. Ital. 17: 116 (1910).

Vitis quinquangularis var. *bellula* (Rehder), comb. nov.

Vitis pentagona var. *bellula* Rehder in Sargent, Pl. Wilson. 3: 428 (1917).

As the name *Vitis pentagona* is preoccupied by two earlier homonyms, namely *Vitis pentagona* (Roxb.) Voigt, Hort. Suburb. Calcutt. 28 (1845), based on *Cissus pentagona* Roxburgh, Fl. Ind. 426 (1820), and *V. pentagona* Lawson in Hooker f., Fl. Brit. Ind. 1: 646 (1875), it must receive a new name, for which the Latin translation of its Greek epithet has been chosen.

Rhododendron trichanthum, nom. nov.

Rhododendron villosum Hemsley & Wilson in Kew Bull. 1910: 119 (1910).—Hutchinson in Rhododendron Soc., Spec. Rhodod. 770 (1930).—Non Roth (1807).

It seems to have been hitherto overlooked that *Rh. villosum* Hemsl. & Wils. is invalidated by an older homonym, namely *Rh. villosum* A. W. Roth,

Bot. Bemerk. 159 (1807), which is a synonym of *Clerodendron fragrans* Jacquin (1798).

***Fraxinus excelsior* f. *aureo-pendula*, nom. nov.**

Fraxinus excelsior var. *aurea pendula* Loudon, Arb. Brit. 2: 1217 (1838). — Schneider, Ill. Handb. Laubh. 2: 830 (1912) "var. *aurea* f. *pendula*." — Lingelsheim in Engler, Pflanzenreich, IV. 243(Heft 72): 50 (1920) "f. *aurea pendula*." — Non var. *pendula* Aiton (1789), nec var. *aurea* Willdenow (1811).

According to Art. 30 and Art. 55 of the Rules of Botanical Nomenclature, the quaternary combination must be reducible to a ternary combination, which in this case cannot be done, because there exists already the older ternary combination *F. excelsior* var. *pendula* Ait. (1838) and *F. excelsior* var. *aurea* Willd. (1811).

***Kalmia latifolia* f. *angustata*, f. nova.**

A typo recedit foliis multo angustioribus, oblanceolatis vel linearioribus, 4–8 cm. longis et 5–10 mm. latis, basi sensim in petiolum attenuatis.

NORTH AMERICA: New Jersey: Dennis township, Cape May County, one large clump, *H. A. Scribner*, March 21, 1944 (Herb. Arnold Arb.).

A specimen of the plant described above was sent to the writer last year by Mr. H. A. Scribner, Forest Supervisor of Belleplain State Forest, New Jersey, who stated that one large clump of this form was found in Dennis township by Forest Ranger Thomas Pettit. Rooted stems of this form were kindly sent this year by Mr. Scribner to the Arboretum for its living collection. There seems to be no reference to such a form in botanical or horticultural literature. Among the numerous specimens of *K. latifolia* in the herbarium of the Arnold Arboretum, there is only one specimen with leaves closely approaching this form, though not quite as narrow, representing a bud sport on a normal plant; the specimen was collected near Lanham, Maryland, by G. N. Collins & F. V. Coville, June 8 or 9, 1926, and consists of two branches from the same plant, one with normal and one with narrow leaves 8–15 mm. broad and 4.5–10 cm. long.

ARNOLD ARBORETUM,
HARVARD UNIVERSITY.

CARYA ALBA PROPOSED AS NOMEN AMBIGUUM

ALFRED REHDER

THE NAME *Carya alba* was first published by Nuttall as one of the species of his new genus *Carya* (Gen. N. Am. Pl. 2: 220. 1818) without citation of the basonym, but it was apparently based either on *Juglans alba* L. (Sp. Pl. 997. 1753) or more likely on *J. alba* Michaux (Fl. Bor.-Am. 2: 192. 1803), since he uses it in the restricted sense of the latter author. *Juglans alba* of Linnaeus comprises two species, as his citations show; those referring to Gronovius, Parkinson and Catesby represent, at least partly, the species called *J. tomentosa* by Poiret (1798) and by Michaux (1803), while the reference to Plukenet may represent the species called *J. ovata* by Miller (1768). These two epithets were transferred to *Carya* as *C. tomentosa* by Nuttall (1818) and as *C. ovata* by K. Koch (1869). Many authors, however, trying to retain the original epithet "alba," applied it differently to one of the two species included by Linnaeus in his *J. alba*. Crantz (1766) and Miller (1768) were the first ones definitely to restrict *J. alba* of Linnaeus to one species; Crantz by citing only Catesby as the type of *J. alba*, and Miller by separating the two species chiefly involved in the Linnaean *J. alba*. Of the authors who followed Miller in keeping the epithet *alba* for the species representing *C. tomentosa* (Poir.) Nutt. may be cited: K. Koch (1869) and Sargent (1922) as *Carya alba*; Britton (1888) and Sargent (1895) as *Hicoria alba*; Sargent (1889) as *Hicorius albus*. Of those authors who followed Michaux (1803) in using the epithet *alba* for the species representing *C. ovata* (Mill.) K. Koch may be cited: Rafinesque (1808) as *Scoria alba*; Nuttall (1818), Emerson (1846 and 1875), C. de Candolle (1864) and Engler (1887), as *C. alba*.

It is probably correct to consider the references to Parkinson, Catesby and Gronovius as representing the type of *Juglans alba* L. and therefore, in transferring the species to *Carya*, it should be named *C. alba*, but from the remarks above and the synonymy cited below, it appears that evidently the majority of authors followed Michaux and applied the epithet *alba* to the species called *C. ovata* (Mill.) K. Koch.

There also arises the question whether the name *C. alba* (Mill.) K. Koch (1869) should not be considered a later homonym of *C. alba* Nuttall (1818) and Emerson (1846) and be rejected according to Articles 54 and 61 of the Rules, or whether it should be called a misidentification. The latter assumption would presuppose typification of *J. alba* L., which can hardly be done with certainty, since the name is based not on herbarium specimens but upon insufficient descriptions by previous authors based chiefly on characters of the nut. For the same reason one can hardly accept *J. rubra* Gaertn. (1791) as validly published, since description and figure are based solely on the nut and would not constitute valid publication according to Art. 43; it should be classed as a *nomen subnudum* and rejected, otherwise it would supersede *J. tomentosa* Poir. of 1798. It therefore seems advisi-

able, in order to avoid confusion and ambiguity through the use of the name *Carya alba*, to declare *Carya alba* a *nomen ambiguum* and to accept the two names *C. tomentosa* (Poir.) Nutt. and *C. ovata* (Mill.) K. Koch as the correct names for the two species involved, as has already been done by Rehder (1940) and L. H. Bailey (1941).

The two accepted names with their synonymy are given below, where complete citations of the names referred to in the discussion above will be found.

Carya tomentosa (Poir.) Nuttall, Gen. N. Am. Pl. 2: 221 (1818). — Emerson, Rep. Trees Shrubs Mass. 194, t.13 (1846); ed. 4, 1: 222, t. (1875). — C. de Candolle in De Candolle, Prodr. 16,2: 143 (1864). — Engler in Nat. Pflanzenfam. III. 1: 25 [1887]. — Rehder, Man. Cult. Trees Shrubs, ed. 2, 123 (1940). — Bailey, Hortus Secund. 145 (1941).

Juglans alba Linnaeus, Sp. Pl. 997 (1753), p. p. — Crantz, Inst. Rei Herb. 1: 157 (1766). — Miller, Gard. Dict., ed. 7, J. no.4 (1768). — Willdenow, Sp. Pl. 4: 457 (1805).

Juglans rubra Gaertner, Fruct. Sem. 2: 51, t.89, fig. k. (1791), nom. subnud.

Juglans tomentosa Poiret in Lamarck, Encycl. Méth. Bot. 4: 504 [1798]. — Michaux, Fl. Bor.-Am. 2: 192 (1803). — Michaux f., Hist. Arb. For. Am. Sept. 1: 184, t.6 (1810).

Scoria tomentosa Rafinesque in Med. Repos. New York hex. 2, 5: 352 (1808).

Carya tomentosa β *maxima* Nuttall, Gen. N. Am. Pl. 2: 221 (1818).

Hicoria maxima (Nutt.) Rafinesque, Alsogr. Am. 67 (1838).

Carya alba (Mill.) K. Koch, Dendr. 1: 596 (1869). — Sargent, Man. Trees N. Am. ed. 2, 188, fig. 178 (1922). — Non Nuttall (1818), nec Emerson (1846).

Hicoria alba (L.) Britton in Bull. Torrey Bot. Club, 15: 283 (1888). — Sargent, Silva N. Am. 7: 153, t.346,347 (1895).

Hicoria alba var. *maxima* Britton, I. c. (1888).

Hicorius albus (L.) Sargent in Gard. & Forest, 2: 460 (1889).

Carya ovata (Mill.) K. Koch, Dendr. 1: 59 (1869). — Sargent, Man. Trees N. Am. ed. 2, 183, fig. 174 (1922).

Juglans alba Linnaeus, Sp. Pl. 997 (1753), p. p. — Michaux, Fl. Bor.-Am. 2: 193 (1803). — Pursh, Fl. Am. Sept. 2: 637 (1814).

Juglans ovata Miller, Gard. Dict., ed. 8, J. no. 6 (1768).

Juglans alba ovata Marshall, Arbust. Am. 69 (1785).

Juglans compressa Gaertner, Fruct. Sem. 2: 151, t.89, fig. i (1791), nom. subnud. — Willdenow, Sp. Pl. 4: 458 (1805).

Juglans latifolia Poiret in Lamarck, Encycl. Méth. Bot. 4: 503 [1798].

Juglans obcordata Poiret in Lamarck, op. cit. 504 [1798].

Scoria alba Rafinesque in Med. Repos. New York, hex. 2, 5: 352 (1808), nom.

Juglans squamosa Michaux f., Hist. Arb. Am. 1: 190, t.7 (1810). — Nuttall, N. Am. Silva, 1: 80, t.36 (1841). — Non Poiret [1798] = *J. glabra* (Mill.) Sweet.

Carya alba Nuttall, Gen. N. Am. Pl. 2: 221 (1818), nom. — Elliott, Sketch Bot. S. Carol. 2: 624 (1824). — Emerson, Rep. Trees Shrubs Mass. 191, t.12 (1846); ed. 4, 1: 217, t. (1875). — C. de Candolle in De Candolle, Prodr. 16,2: 142 (1864). — Engler in Nat. Pflanzenfam. III. 1: 25 [1887], nom. in obs.

Hicoria ovata Britton in Bull. Torrey Bot. Club, 15: 283 (1888). — Sargent, Silva N. Am. 7: 153, t.346,347 (1895).

Hicorius ovatus Sargent in Gard. & Forest, 2: 460 (1889).

Scoria ovata Macmillan, Metasperm. Minnesota, 178 (1892).

THE ARNOLD ARBORETUM DURING THE FISCAL YEAR ENDED JUNE 30, 1945

THE INSTITUTION was operated during the year within the limits of its income and a modest addition was made to its departmental balance from unexpended unrestricted income. It was expected that a deficit might develop because of a rather radical increase in the labor payroll, as we had to meet the University standards as to daily wages of skilled and unskilled labor, and no budgetary provision had been made to meet this increase. Also, on April 1, 1945, we took title to the Marian Roby Case estate in Weston, mentioned elsewhere in this report, and assumed the rather considerable maintenance costs involved, although the addition to income from Miss Case's generous bequest to endowment funds is not yet available as the estate has not yet been settled.

In addition to income from its restricted endowment, the extra-budgetary Gifts for Cultural Purposes Fund was increased by \$2360.00 in the form of voluntary gifts from forty-eight individuals, while the special Publications Fund was increased by \$10,120.00 from eighty-five contributors, including a very generous grant of \$3000.00 from the Trustees of the Morton Arboretum, Chicago, in appreciation of the cordial relationships that have existed between the two institutions since that institution was organized in 1921. Because of the situation in reference to Professor Rehder's continued work on his Bibliographic Index project, it was felt that the least the Arnold Arboretum could do would be to underwrite the cost of publication of the extensive volume that will result. He has devoted practically full time to the preparation of the manuscript since his retirement from active service in 1940. Therefore, a limited appeal was made for contributions to the Publication Fund, and I am happy to state that this is now sufficiently ample for the purpose. No appeal was made for contributions to the Gifts for Cultural Purposes Fund, as it was not felt that this was justifiable under war conditions. One grant of \$400.00 was received during the year from the Society of Sigma Xi to complete the amount needed for the Raup Alaska Military Highway expedition.

Invested funds remained at approximately the same level as during the preceding year, the regular additions to capital being made to the James Arnold Fund and to the Charles Sprague Sargent Fund in accordance with the terms of the gift. However, under the provisions of two wills now in probate, it is expected that the total endowment of the Arnold Arboretum will be very considerably increased during the coming year, as the two estates are closed.

Under the will of the late Miss Marian Roby Case of Weston, the Arnold Arboretum was indicated as a beneficiary to the extent of \$150,000.00 to capital, and her real estate in Weston consisting of about ninety acres adjoining the estate of her sister, Miss Louisa W. Case, which was presented

to the institution in 1942, with all the buildings, farm equipment, etc. The buildings are insured on the basis of a valuation of \$79,000.00. For tax purposes the land was assessed on the basis of a valuation of about \$37,000.00. In addition, she indicated the Arnold Arboretum to be the recipient of all of her residuary estate after certain specific bequests had been paid. This may prove to be the largest single gift to the institution in the seventy-three years of its existence. The other large bequest is that of Mrs. Katherine T. Balch, wife of the late John Balch of Milton, who made the Arnold Arboretum the beneficiary of one-half of her residuary estate, which may amount to more than \$100,000.00. Both of these bequests were arranged within the past few years.

The conditions of gift are interesting. Mrs. Balch indicated that her gift should be utilized as far as possible for the support of practical horticulture and "for such uses as may reasonably add to the interest and enjoyment of the average visitor and the general beauty of the Arboretum." Miss Case stipulated in her will: "In connection with the gifts herein contained to the President and Fellows of Harvard College for the use of the Arnold Arboretum I impose no restrictions whatever except that the land or its proceeds and the pecuniary bequests shall be used for the general purposes of the Arnold Arboretum. It is, however, my earnest hope that the estate may be maintained and the bequests utilized to further the development of my land and the adjoining land recently presented by my sister, Miss Louisa W. Case, as an adjunct to the Arnold Arboretum in order that the work of that institution may be amplified in a non-urban center, and yet one that is reasonably close to the City of Boston." Our tentative plans for development of the two adjoining estates in Weston appear elsewhere in this report.

Staff.—The Arboretum suffered a very severe loss in the death of Mr. Louis V. Schmitt, Superintendent of Buildings and Grounds, on November 16, 1944. Mr. Schmitt had been associated with the institution continuously since 1905, was thoroughly conversant with his duties, very efficient, and always had the best interests of the Arboretum in mind. The place made vacant by his untimely death was filled on January 1, 1945, by the appointment of Mr. Robert G. Williams, a graduate of Cornell University, and former Superintendent of Parks, Greensboro, North Carolina. The technical staff remained as in the previous year, with Dr. Kobuski in active military service, still on leave of absence. Several of the younger men in the grounds department were also absent on military duties. Dr. H. M. Raup was promoted in rank to the position of Associate Professor of Plant Geography. Following the resignation of Mrs. Janet R. Sellars as librarian, Mrs. Lazella Schwarten was appointed to the position. Dr. Lawrence M. Ames, a staff member of the U. S. Department of Agriculture, who for nearly twelve years made his headquarters at the Arboretum, with office and other privileges, finished his work for the Department and left during the year.

Instruction.—The graduate student situation was unchanged, very few being in residence at the University. Dr. Johnston and Dr. Raup continued their special courses designed for both graduate and undergraduate students. No radical increase in instruction duties is anticipated until after the close of the war. Professor Bailey has devoted much time, with the assistance and advice of various staff members, to the preparation of a comprehensive report for the administration on botany at Harvard University, both within the Department of Biology and in the nine separately endowed research units, and covering the relationships of the separately endowed units to the University through the Department of Biology. The final report was submitted before the close of the year.

Buildings, grounds and horticulture.—No changes have been made in the buildings other than the minor repairs, painting, etc., necessary to maintain them in good condition. Some extra work has been involved with the acquisition of the several buildings on the Case estate in Weston.

As was the case last year, the plantings have suffered from lack of care due largely to the acute labor shortage, supplemented by a combination of circumstances beyond our control. At no time within the history of the Arboretum are signs of neglect more apparent than now. Unless constant attention be given to such items as trimming, pruning, removal of overgrown or malformed shrubs, trees, and vines and their replacement by others, weeding, spraying, fertilizing, grass cutting, and other standard maintenance practices, plantings quickly get out of hand. Until more labor is available, we cannot cope with this situation. It is a concomitant of the unsettled conditions brought about by the war and we will have to bear with it until after the close of hostilities.

Abnormal seasonal conditions and other circumstances added to our difficulties. There was little winter injury due to low temperatures, and there were but few, and not at all destructive, grass fires in the fall and spring because of the abundance of rainfall. A very heavy fall of wet snow on February 8 caused an extraordinary amount of limb breakage, it taking the entire grounds crew three weeks to take care of only the most obvious places by the necessary and often heavy pruning. Many of the shrubs were crushed to the ground and some of them will need very heavy pruning before they again become attractive in form. This delayed the normal spring rehabilitation campaign, but here again the season was against us, for the period of bloom commenced a full month ahead of the normal time. Following this unseasonably warm weather, there was a protracted wet season lasting into the summer months, thus favoring a most unusually lush growth of grass and coarse weeds. Without our knowledge, a large addition had been planned to the State Serum Laboratory building in the Bussey Institution grounds. The architect's plan had been finished and the contract let before we were informed. It so happened that the area selected for the building was fully occupied by our extensive nursery. Thus, on very short notice, we had to prepare a new nursery site and

transfer all of the valuable stock from the old nursery. Because of the abnormally advanced season, we had but about a week in which to make this radical change. A week or two later it would have been impossible to move the stock with safety, as the spring growth had commenced or was about to commence. It was most fortunate that we learned of this projected building plan in time, otherwise our losses in valuable selected stock would have been very great. As it was, it put an additional strain on our relatively small grounds crew at a most critical time and further prevented them from giving proper attention to other maintenance matters.

Thus, largely because of war conditions, it has become increasingly difficult to maintain the living collections in an attractive condition. No new plants were added to the permanent living collections during the fall and spring planting seasons, and it is clear that plantings of new material should be kept at a minimum until the time arrives when we can properly care for what we have in place. Because of the limited amount of labor available, it has been necessary to concentrate the work on special projects and let the other areas remain with a minimum of care.

Special attention was given in the fall to the extensive shrub collection near the Forest Hills gate, as it had become badly overgrown. Each alternating grass walk was removed, and the soil was limed and heavily fertilized. All the shrubs were heavily pruned and the labels were replaced by new ones, these being set back from the walks so as to permit of machine cultivation. It is evident that this thorough renovation was justified, for the annual cost of maintaining this large collection was reduced by about one-half, due to the saving of hand labor. It is planned to continue this concentration of work for several years or until all of the large special collections have been renovated. The next one in line is the very large lilac collection, some clumps of which have become badly overgrown, while others have developed altogether too many sucker shoots.

A new nursery was established on prepared land between South Street and the railroad track, but this is only a temporary expedient. The nursery on the Case estate in Weston was enlarged, and some of our valuable stock in the old nursery, that had to be abandoned because of the projected building mentioned above, was transferred there.

In spite of war conditions, 447 living plants were received and established in our nurseries. At the same time, we received also nine lots of scions and eighty-nine lots of seeds. During the year 496 living plants were distributed, as well as 48 lots of scions and 22 packages of seeds; 175 trees and shrubs were presented to the Harvard Business School to be utilized in a planned improvement of its grounds.

In order to keep maintenance charges at a minimum on the Case estate until such time as income may be received from the Marian Roby Case bequest, certain changes are being made on the Weston property, chiefly in the elimination of certain types of plantings that scarcely fall within the field of the Arboretum. Thus one planting of about 700 named varieties of *Iris* has been eliminated, but the plants were not destroyed. A complete

collection of these was sent, through Garden Clubs Services, Inc., to the Essex Sanatorium in Danvers for use in beautifying the grounds and to assist in the retraining of disabled veterans, chiefly psychiatric cases. A selected lot of about 100 of the better varieties was sent to the Rutland Training Center of the Central New England Sanatorium for the same purposes. About 500 varieties were presented to the Boston Park Department.

Further mechanical equipment has been acquired, including a new Fordson tractor with attachments for plowing, cultivating, and hay cutting, with view to further reducing the amount of hand labor needed to maintain the attractiveness of the grounds. We should now be able to take care of these items with our own force and equipment; formerly, for certain types of work, we had to arrange contracts with outside individuals or firms.

The Case Estates in Weston.—As previously reported, the estate of Miss Louisa W. Case in Weston, consisting of about 60 acres of land, a large residence, barns, and a very excellent and commodious greenhouse, was presented by her to the Arnold Arboretum in December, 1942. Miss Marian Roby Case of Weston, sister of Miss Louisa W. Case, redrew her will in 1943 in favor of the Arnold Arboretum as mentioned in the opening part of this report. This estate comprises about 90 acres of land and eight buildings of one type or another. Our very keen desire is to develop these two adjoining estates as an adjunct to the Arnold Arboretum and to concentrate there most of our experimental work, including some of that of the Bussey Institution and of the Cabot Foundation for Botanical Research, and a part of Dr. Mangelsdorf's corn breeding project, as excellent farm land is now fortunately available. It is expected that much of our propagating work will also be done at the Weston site and the material moved in to the Arboretum proper as needed.

An excellent opportunity is thus afforded for a general expansion of our experimental work, and at the same time a judicious planting of ornamental and useful trees and shrubs in Weston to augment those of the Arnold Arboretum. For many years it has been evident that the present Arboretum site is not suitable for certain types of work. It can and must be maintained as an attractive park, but with the very limited amount of really good land available, the present crowded condition of its plantings, the pressure of the population (for the Arboretum site adjoins a densely populated part of Boston), and a certain amount of vandalism that it is practically impossible to control properly, we are badly handicapped. With this opportunity now open in the strictly residential town of Weston, only twelve miles from the Arboretum in Jamaica Plain, we have the opportunity of greatly amplifying our experimental and propagating work, and of initiating lines of research that it has hitherto been impossible to develop on the original site. Again, in Weston we will not be subject to the population pressure, vandalism will be at a minimum, and the plantings will not be damaged by the smoke and dust of the city.

In anticipation of a definite plan of improvements for the Weston properties, about ten acres of the best farm land were plowed, fertilized, and cover-cropped in the spring in order to get the land into first-class condition for future operations. Seed beds have been prepared, hot beds installed, and nursery space expanded. Some general clearing has been prosecuted, certain decrepit trees and shrubs removed, and a definite policy of reducing actual agricultural operations in favor of experimental work and arboretum development actually initiated. Thus it seems to be clear that in future years the Weston property can be developed into a highly useful adjunct to the Arnold Arboretum, to serve not only the purposes of this unit, but also those of several of the other separately endowed botanical units as well as the Department of Biology of Harvard University, where certain types of research demand proper space and a reasonable amount of land. There we can closely control the situation without undue interference by certain elements of the general public; in its present site the Arboretum proper can never expect to maintain the strict control that is demanded in connection with experimental plantings.

The War Effort.—We have continued to coöperate with different government agencies in work on various botanical problems with which representatives of the armed services became involved, particularly in reference to the Southwest Pacific area, Micronesia, the Philippines, and in preparation for projected operations in China, Formosa, and other oriental countries. *Native Woods for Construction Purposes in the Western Pacific Region*, compiled by Dr. J. H. Kraemer, was issued by the Bureau of Yards and Docks, Department of the Navy, May, 1944, and a greatly amplified edition appeared in September, 1944, both restricted. The illustrations were prepared at the Arnold Arboretum and the basic lists were prepared here. A third volume, *Native Woods for Construction Purposes in the South China Sea Region*, unrestricted, appeared in January, 1945, in the preparation of which we also coöperated, although some of its illustrations were prepared at the Smithsonian Institution, in part based on material that we loaned for the purpose.

Dr. I. M. Johnston made two special trips to the tropical base of the Chemical Warfare Service in connection with certain problems with which that organization was concerned in connection with its tropical operations. This field work cannot at the present time be discussed further because of its confidential nature, but the large collections assembled by him will be the basis of a future technical paper when restrictions shall have been modified.

We have continued to receive and to report on botanical collections made by service men stationed here and there in the Old World tropics, shipments coming in all the way from Upper Burma to New Caledonia. It has so far been possible to report upon each lot within a day or two after the packages were received. Most of this work has fallen to the undersigned, who has also continued to lecture every two months to each

group of trainees in the intensive course on tropical medicine at the Army Medical School in Washington. Work on the manuscript of *Plant Life of the Pacific World* was completed and the proofs were finished before the close of the year. The sales edition of this work is published by the Macmillan Company, but simultaneously a special unabridged Fighting Forces edition, pp. 298, 256 fig., was issued by the Infantry Journal, Washington, D. C., in its series of standard military books. This book is one of a series on various phases of natural history of the Pacific region, including individual volumes on the animals, native peoples, fishes and shells, reptiles, insects, birds, etc., following the publication of *The Pacific World*, edited by Fairfield Osborn, President of the New York Zoological Society, under the auspices of the American Committee for International Wild Life Protection. Each volume was oriented toward the needs of our service men stationed here and there in the Pacific region.

Botanical Survey of the Alaska Military Highway.—A second season's work was projected during the preceding year and the plans were outlined in the report for 1943-44. The personnel of the party and the sources and amounts of funds (\$5300.00) provided to take care of field expenses were also indicated. The party of seven left for the field at the end of May and returned about the middle of September. The military authorities extended the same privileges as those provided during the summer of 1943, that is, free transportation on the road and commissary privileges. The results obtained in botany, ecology, geology, and archaeology are significant. Work was concentrated on the upper part of the road from Fairbanks to Whitehorse, as the 1943 operations covered the southern part of the road from Dawson Creek to Whitehorse, but at the end of the season, the party came out via Dawson Creek, thus covering the entire length of the road, some 1500 miles. Approximately 13,000 botanical specimens were prepared, and this large collection, combined with the even larger one (15,000 specimens) made in 1943, will be studied as a whole and thus form the basis of a comprehensive report on the vegetation of the previously little known region traversed by the road.

Plant Breeding.—The more promising new hybrid trees and shrubs are being propagated for further testing and for distribution. Among the more recent productions are species hybrids of maples, honeysuckles, forsythias, lilacs, roses, apples, and cherries. Triploid forsythias have been produced by crossing the artificially induced tetraploids with diploids. Experimental work on polyploidy has been continued.

The more important genera of the Pomoideae are being used in an attempt to obtain rootstocks which will produce dwarf trees or otherwise modify the normal growth habit of the grafted stock. The grafting compatibility of generic combinations in this subfamily of the Rosaceae has long been known but no systematic study has been made. *Crataegus*, *Chaenomeles*, *Cydonia*, *Aronia*, and *Sorbus* are being grown on *Malus* rootstocks and

many more combinations are being made. Many of these will grow, as grafts, only for a year or two, but some of the progeny may prove to be of horticultural value. The large temporary orchard of hybrid crab apples established a few years ago on the Walter Street tract has served its purpose. The promising new hybrids have been segregated and the worthless stock removed.

Wood Anatomy.—Professor Bailey and Dr. Nast have continued their morphological investigations of the ranalian families in collaboration with Dr. Smith. Detailed anatomical and histological studies have been made of the stem, roots, leaves, floral organs, pollen, and seeds of the taxonomically puzzling genera *Tetracentron*, *Trochodendron*, and *Euptelea*. Although superficially dissimilar, *Tetracentron* and *Trochodendron* exhibit fundamentally significant similarities in their vesselless xylem, in their peculiar stomata, ovules, seeds, pollen, and internal floral structure. The genera should be placed in two separate, but closely related, families. *Euptelea* differs from these genera in the morphology of all of its organs and should be maintained as an independent family. There are no evidences of close genetic relationships between the Tetracentraceae, Trochodendraceae, or Eupteleaceae and such families as the Magnoliaceae, Winteraceae, or Schisandraceae.

The Herbarium.—During the year 14,281 specimens were mounted, of which 12,193 were inserted into the herbarium, which now contains a total of 630,137 specimens.

In continuation of the arrangement with the Gray Herbarium mentioned in the last report—the mounting of some of the accumulated Old World collections belonging to that institution—2276 specimens were returned mounted. The mounting of specimens at the Arboretum continues at the rate of incoming material, a rate below normal due to war conditions. However, this has its compensation in that the mounting staff is able to devote considerable time to repairs of material already incorporated, many of the early collections having been placed in the herbarium inadequately strapped.

Incoming specimens numbered about 27,945. The bulk of this material was obtained by subsidy, purchase, or by collections of staff-members, but some of it came through exchanges (3,545), gifts (1,154), or for identification by our staff (2,190). Especially noteworthy collections were about 13,000 specimens obtained by Dr. Raup during his second season along the Alaska Military Highway, about 3,500 specimens gathered by Dr. Johnston on San José Island, Panama, and 2,491 specimens sent by Dr. J. Cuatrecasas from Colombia as the result of a trip partly financed by the Arboretum. Geographically, acquisitions may be broken down as follows: America north of Mexico, 13,684; Central America and Mexico, 4,273; West Indies, 918; South America, 3,532; Pacific Islands and Australasia, 1,742; Asia and Africa, 1,345; miscellaneous (mostly cultivated or North American), 2,451.

A total of 17,274 specimens was distributed to other American institutions, the bulk of this material going to other departments of Harvard University as inter-institutional transfers. To the Gray Herbarium were transferred 14,083 specimens, of which 9,648 were mounted; this last figure includes 7,835 Argentine specimens originally received from the Instituto Miguel Lillo, Tucumán, and mounted at the Arboretum over a period of two or three years. Thirty-five specimens were transferred to the Farlow Herbarium and a similar number to the Ames Orchid Herbarium at the Botanical Museum. To other American institutions the Arboretum sent 2,982 specimens in exchange, 101 specimens as gifts, and 38 specimens for identification. A total of 1,281 mounted illustrations of herbaceous plants and ferns was transferred to the Gray Herbarium for incorporation into the collections. Microfilm and publications to the equivalent value of 1,601 specimens were distributed. To summarize, the total number of specimens or their equivalent in illustrations, microfilm, or publications distributed by the Arboretum was 20,156.

Staff-members and students of ten American institutions requested and were granted 20 loans from the Arboretum, totaling 3,207 specimens and 97 clippings and illustrations. For study by members of our own staff, 33 loans consisting of 2,284 specimens were borrowed from eleven institutions.

A total of 1,652 cards was added to the catalogue of references to new species and other important literature dealing with woody plants, this catalogue now containing 138,650 cards. For the second successive year no additions were made to the collection of negatives representing types and critical specimens; this is partly due to the lack of adequate photographic equipment and partly to the fact that specimens which might normally be photographed are not now available on loan.

Crowding of specimens in the herbarium grows more critical each year, as no additional floor space or cases are available; as usual, only the most important material has been filed in the herbarium, the remainder being stored in a more or less inaccessible place. The usual number of clippings, typed descriptions, and illustrations was inserted into the herbarium.

Special studies were pursued by members of the herbarium staff, and the usual routine identifications were made. Professor Rehder continued to work on his Bibliography of Cultivated Trees and Shrubs, prepared several papers on detailed problems of nomenclature, and devoted considerable time to the assistance of other staff members and visitors who continue to seek his advice. Dr. Smith, in collaboration with Professor Bailey and Dr. Nast, completed work on certain small families of the Ranales and began a study of the Schisandraceae and its immediate allies; he also studied special groups of tropical collections. Dr. Johnston devoted most of his time to botanical work for the Chemical Warfare Service, making two extended trips to the tropical research center maintained by that organization. Data for publication will not be available until after the close of the present war. Dr. Raup has continued work on his assembled data on the vegetation of the Athabaska-Great Slave Lake region and on

the Mackenzie Mountains, and excellent progress has been made in preparing the material for publication. Work on both of these projects was interrupted because of his absence during the summers of 1943 and 1944 in prosecuting a botanical survey of the Alaska Military Highway, mentioned elsewhere in this report. He has organized his very extensive botanical collections made during the two summers mentioned, some 28,000 specimens, in preparation for an intensive study of them. He has also, in association with the archeologist Mr. Frederick Johnson of Andover, re-initiated his study of the peat deposits in the Taunton River estuary, an interesting archeological site which is now covered by several feet of salt-marsh peat and is well below high tide. The joint report on this investigation has been completed and it will be published shortly. Dr. Kobuski, after nearly three years of military service, was granted an honorable discharge in June and will rejoin the Arboretum staff in the near future. Mr. Palmer continued his study of the genus *Crataegus* and also investigated the taxonomy of certain hybrid oaks. Dr. Allen completed her study of the Lauraceae of Central America and Mexico and prepared a revision of the group for this area. Dr. Perry's translation of Professor H. J. Lam's "Fragmenta Papuana" from the Dutch was completed and the English work was published as No. 5 of *Sargentia*; in addition she continued her study of the New Guinea material of the Richard Archbold Expeditions, mostly in the large family Rubiaceae. Dr. Croizat pursued his studies of the Euphorbiaceae, with special attention to groups from South America and the southwestern United States. I have continued certain types of bibliographic work, mentioned under bibliography in this report, continued to report on packages of botanical material sent in by service men from Upper Burma, Assam, the Philippines, Micronesia, New Guinea, Solomon Islands, and New Caledonia, and completed the proof reading of *Plant Life of the Pacific World*.

Bibliography.—Dr. Frans Verdoorn edited volumes one and two of the new *Annales Cryptogamici et Phytopathologici*, which is a continuation of the earlier *Annales Bryologici*; also edited by him are volume eight of the *Chronica Botanica* and volumes fifteen and sixteen of *A NEW SERIES OF PLANT SCIENCE BOOKS*. The last volume, *Plants and Plant Science in Latin America*, is an extensive work prepared with the coöperation of nearly one hundred collaborators. It includes a revised edition of his list of Latin American plant science institutions and societies, which is used as a basic list by many agencies of the United States and foreign governments. He also continued to act as botanical adviser to the Board for the Netherlands Indies, Surinam and Curaçao, and to guide the activities of the Central Depository Library for the Netherlands Indies in New York City. During the year about 15,000 sheets were added to the master file of his major project, the *Index Botanicorum*, and a booklet describing the aims and scope of this project was issued in the fall of 1944 which resulted in his securing the services of many new collaborators.

Professor Alfred Rehder, retired, continued to work daily on his comprehensive Bibliographic Index, and it is expected that the very extensive manuscript will be completed and ready for publication before the middle of the coming year; well in excess of 2,000 pages of typescript is finished. Fortunately, funds are now available to cover the cost of publication of what will prove to be a very useful reference work. My own work has been largely bibliographical, in an attempt to complete the manuscript, now some 1,400 typed pages, of a comprehensive Index Rafinesquianus, and with corresponding problems in connection with the published works of William Bartram, H. L. Muhlenberg, and Amos Eaton. The total number of validly published generic and specific names in all of Rafinesque's known published works that remain unlisted in our standard indices will approximate 3,400. Work on this project led me to an examination of the published works of the other three early American botanists, and in their works it is now evident that there are also many unlisted technical names. A paper on the botanical names published by William Bartram was finished and is now in press, while work on the Muhlenberg and Eaton problems is well advanced.

The Library. — The library holdings were increased by 271 bound volumes and 144 pamphlets, making the totals in each group 45,834 and 13,606. Seven hundred and eleven typewritten cards were added to the main catalogue, 3664 printed cards to the Gray Herbarium index, while 817 slips supplementing the author and subject catalogue were added to the file. The very extensive series of photographs was increased by 200 items, while many orders were received for prints from our negatives. Inter-library loans have been extensive, a total of 510 volumes being loaned to or borrowed from 34 libraries in all parts of the country. This inter-library loan service is of great value to staff members of both this and other institutions, as well as to students, and the privilege is not abused. There have been no losses, although various rare items have of necessity been involved. The most outstanding gift was a magnificently bound eight-volume set of Sander's *Reichenbachia* from Mrs. Theodore Brown of Milton, and the rare three-volume elephant folio edition of the Audubon-Bachman *Viviparous Quadrupeds of North America*, from the late Miss Marian Roby Case of Weston.

Atkins Institution of the Arnold Arboretum. — The limitations mentioned in the report for the previous year prevailed, the plantings unfortunately being now in a somewhat deplorable condition. The chief factor here was the increased cost of labor, combined with the fact that the general plantings had been extended to such an extent that it was impossible to give them all proper care within the limits of the income available. No students were in residence because of war conditions, but a number of individuals interested in research and in economic problems visited the institution to secure information of one type or another.

About thirty new seed beds with cement borders were constructed to keep the soil from being washed down by heavy rains. Some of these were planned for vegetable growing, others for the development of seedlings of timber trees. In June there was delivered to the Soledad Company somewhat over 1,000 young teak trees to be used in the extension of its timber plantings. Seedlings of other important timber trees are available for future plantings.

In spite of an abnormally dry year, the rainfall being 42.69 inches, about ten inches below normal, a number of the larger specimens were moved from the nursery to their permanent places in the grounds, and this will be continued until the available material is taken care of. Opportunity was taken, because of the unusual dry period in May and June, when all of the ponds were empty, to check the dams and to make the necessary repairs.

During the year, 162 packages of seeds and 50 living plants were received from abroad, and seeds from 123 different species were collected in the garden to be used there. Distributions included 230 packages of seeds and 652 living plants. Of the latter, over 300 were sent to the Marine Corps base at Guantanamo to be used in landscaping the grounds, and 136 were presented to the Cuban Ministry of Agriculture.

The entire problem of the future development and utilization of the facilities available at Soledad for instruction, research, practical horticulture, and forestry has received considerable attention, one special short report having been prepared expressing my personal ideas on the subject, and the matter is further considered in the area survey report prepared for the administration by Professor I. W. Bailey.

The resignation of Mr. David Sturrock as Superintendent was accepted, effective at the end of June, 1945, and Mr. Frank G. Walsingham was promoted to fill the vacancy.

Publications.—The usual four numbers of the Journal included 35 technical papers, mostly by members of the Arboretum staff, and a fifth number of *Sargentia*, containing Dr. Perry's translation from the Dutch of Professor Lam's "Fragmenta Papuana," with two maps and 32 text-figures taken from the original, was published. The usual numbers of *Arnoldia* were issued. Several of the papers included in *Arnoldia* have been highly commended for their practicability, including one number on rapidly growing vines available in the United States, an outgrowth of certain phases of our earlier camouflage investigations, one on the Park Arboretum (how to establish a living war memorial) which has been widely reproduced, and one on the building up of bird populations through selecting food plants. The Massachusetts Audubon Society had 10,000 reprints of this prepared for its own use. As usual, a certain number of technical and popular papers were prepared by staff members and published in various periodicals. A bibliography of the papers published by staff members and students follows.

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E. D. MERRILL,
Director

Staff of the Arnold Arboretum

1944—45

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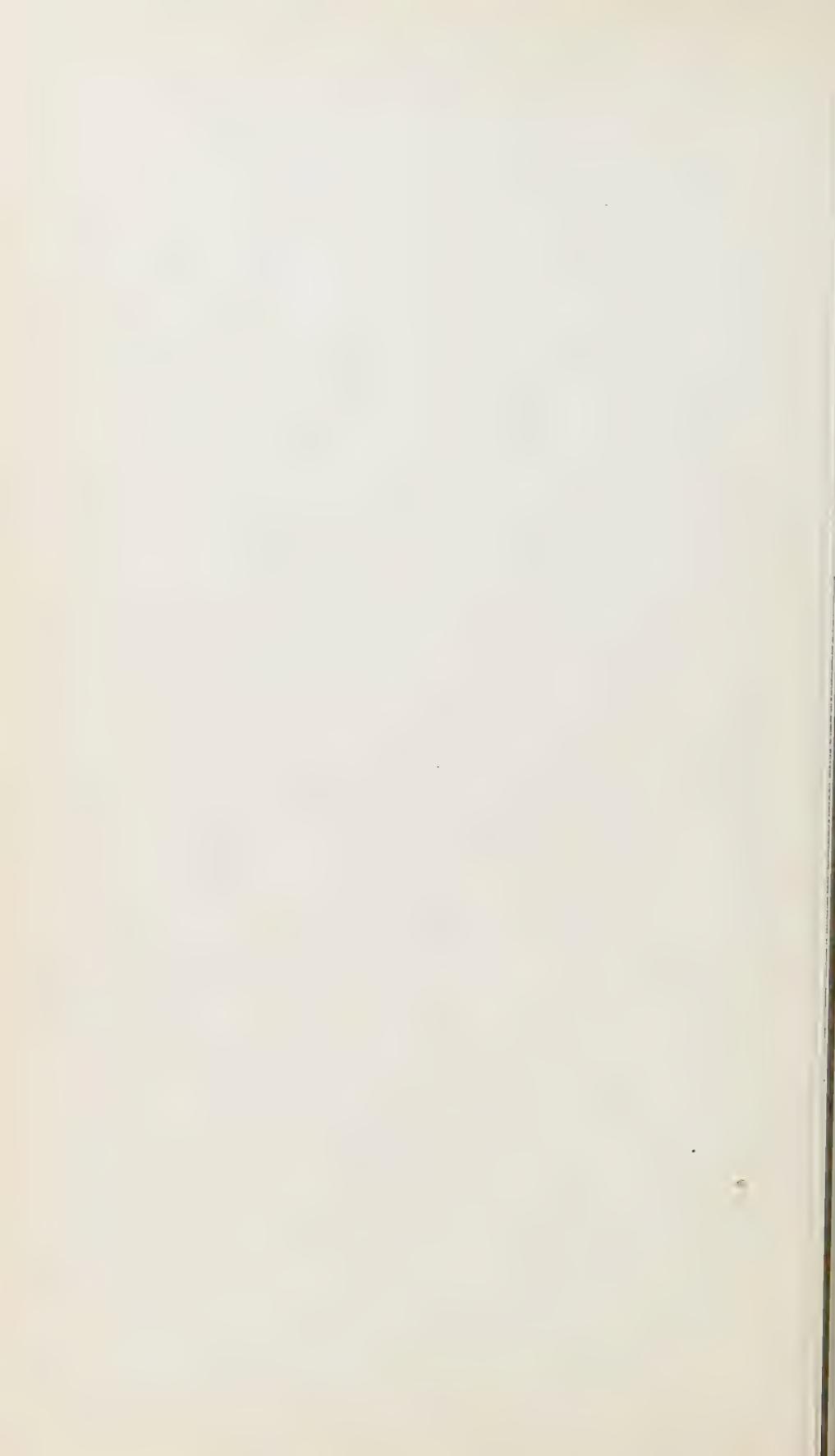
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* On leave of absence for service in the U. S. Army.



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